California High-Speed Rail Authority

RFP No.: HSR 14-32

Request for Proposals for Design-Build Services for Construction Package 4

Reference Material, Part C.11
PE4P Non-Standard-Complex Structures Report

Note: Southern limit of CP4 ends just north of Poplar Ave, at approximately station WS1 5880+00, even though this document shows the limit just north of 7th Standard Road. Work south of the contract limit of WS1 5880+00 should not be considered as part of the contract

CALIFORNIA HIGH-SPEED TRAIN

Engineering Report

Preliminary Engineering for Procurement Record Set Submission

Fresno to Bakersfield

Sierra Subdivision Construction Package 4 Nonstandard and Complex Structures Report

October 2014

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CALIFORNIA
High-Speed Rail Authority

Record Set
Fresno to Bakersfield
Sierra Subdivision
Preliminary Engineering for Procurement
Construction Package 4
Nonstandard and Complex Structures Report

Prepared by:

URS/HMM/Arup Joint Venture

October 2014

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List of Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
Authority	California High-Speed Rail Authority
Caltrans	California Department of Transportation
CHSTP	California High-Speed Train Project
CIDH	cast-in-drilled-hole
CSDC	Caltrans Seismic Design Criteria
CSiBridge	CSiBridge V1520 (Computers and Structures, Inc.)
FB	Fresno to Bakersfield
GI	ground investigation
HSR	high-speed rail
LLRM	modified Cooper E-50 loading
LLRR	maintenance and construction train (Cooper E-50)
MCE	maximum considered earthquake
MSE	mechanically stabilized earth
NCL	no-collapse performance level
OBE	operating basis earthquake
OPL	operability performance level
PE4P	preliminary engineering for procurement
PC	prestressed concrete
RC	Regional Consultant
SR	State Route
TM	Technical Memorandum

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Section 1.0

Introduction

1.0 Introduction

1.1 Project Overview

In 1996, the State of California established the California High-Speed Rail Authority (Authority). The Authority is responsible for studying alternatives to construct a rail system that will provide intercity high-speed rail (HSR) service on over 800 miles of track throughout California. This rail system will connect the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The Authority is coordinating the project with the Federal Railroad Administration. The California High-Speed Train Project (CHSTP) is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology that will include state-of-the-art safety, signaling, and automated train-control systems.

The statewide CHSTP has been divided into a number of sections for the planning, environmental review, coordination, and implementation of the project. This *Nonstandard and Complex Structures Report* is focused on the section of the CHSTP between Fresno and Bakersfield, specifically the Construction Package (CP) 4 subsection of the alignment extending from 1 mile north of the border between Tulare County and Kern County to the crossing of 7th Standard Road south of the City of Shafter.

1.2 Project Description

1.2.1 Fresno to Bakersfield High-Speed Rail Section

The proposed Fresno to Bakersfield (FB) Section of the HSR is approximately 114 miles long and traverses a variety of land uses including farmland, large cities, and small cities. The FB Section includes viaducts and segments where the HSR will be at-grade or on embankment. The route of the FB Section passes by or through the rural communities of Bowles, Laton, Armona, and Allensworth and the cities of Fresno, Hanford, Selma, Corcoran, Wasco, Shafter, McFarland, and Bakersfield.

The FB Section extends southeast from north of Stanislaus Street in Fresno to the northernmost limit of the Bakersfield to Palmdale Section of the HSR at Oswell Street in Bakersfield.

CP4 begins at STA 4435+50, 1 mile north of the Tulare/Kern County line and approximately at the midpoint of Allensworth Bypass and finishes at STA 6291+00 just before crossing 7th Standard Road (*RS 15% Drawings).*

1.2.2 Alignments

The FB HSR Section, shown in Figure 1.2-1, is a critical link connecting the northern HSR sections of Merced to Fresno and the Bay Area to the southern HSR sections of Bakersfield to Palmdale and Palmdale to Los Angeles. The FB Section includes HSR stations in the cities of Fresno and Bakersfield, with potential for constructing a third station near Hanford subject to achieving ridership targets. The Fresno and Bakersfield stations are this section's project termini.

The FB Section of the HSR is generally divided into the following subsections with alignment prefixes.

Table 1.2-1, Figure 1.2-1 and Figure 1.2-2 illustrate the subsections and their corresponding alignments.

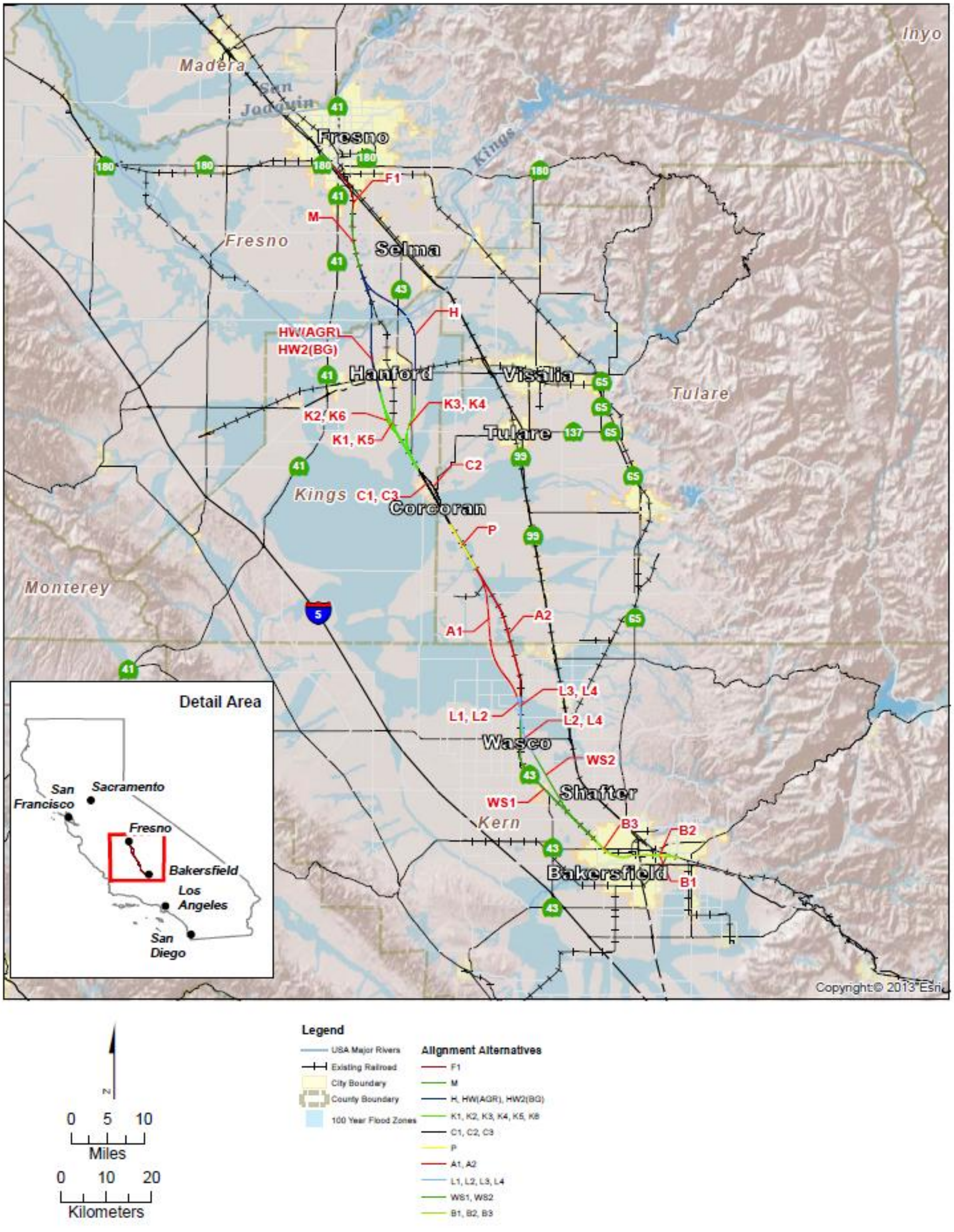

Figure 1.2-1
Overview of Alignments

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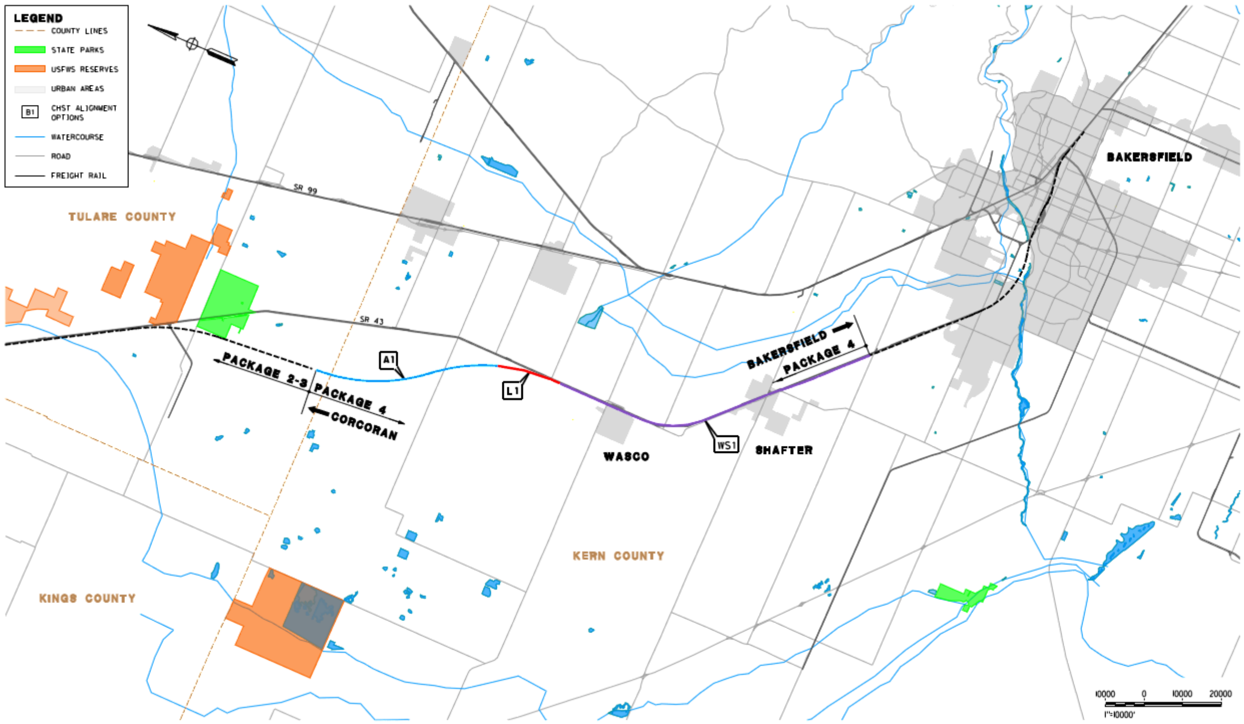

Figure 1.2-2
Overview of CP4 Section

Table 1.2-1
FB Alignment Subsections in CP4

Alignment Prefix	Alignment Subsection Name	Location		County	EIR/EIS* Name
		Begin	End		
A1	Allensworth Bypass	Ave 84	Elmo Hwy	Tulare	Allensworth Bypass
L1	Poso Creek	Elmo Hwy	Jackson Ave	Kern	Allensworth Bypass (connects to Wasco-Shafer Bypass)
WS1	Through Wasco-Shafter	Jackson Ave	Hageman Rd	Kern	BNSF (Through Wasco-Shafter)

*Environmental Impact Report/Statement

1.2.3 Structures

Of the 114-mile FB Section, as much as 30% of the HSR mainline will be carried on structure. Alignments are typically elevated to clear obstacles such as existing railroads, roadways, and waterways. But elevated structures may also be proposed in floodways or as an effort to reduce impacts on nearby properties.

The majority of elevated structures will be in the form of aerial viaducts, composed of a standard design of prestressed concrete box girders. In locations where it is not practical to use the standard box girder type, other structural types have been proposed, such as trusses, balanced cantilevers, and elevated slabs. The reasoning for using each type has been discussed in the *15% Record Set Advance Planning Study Report* and the *15% Record Set Constructability Assessment Memo.*

In circumstances where the proposed mainline will disrupt existing infrastructure routes, such as existing roadway networks, new structures are proposed to allow these networks to maintain connectivity over the HSR right-of-way. Preliminary roadway realignments and roadway structure designs have been developed as part of the 15% design phase.

In addition to the defined roadway and HSR mainline structures, several ancillary structures have been addressed as part of the preliminary design. Most of these structures have been identified in order to service existing railroad lines that will be affected by the proposed HSR alignment, most notably the BNSF Railroad and the San Joaquin Valley Railroad.

For structure type and location, refer to the *RS 15% Design Submission FB Plans and Elevations and Typical Sections*. For nonstandard and complex structures, see *PE4P FB CP4 Nonstandard and Complex Structure Plans*.

1.3 Structure Classification

This report covers only the HSR structures within CP4 considered to be nonstandard or complex. Technical Memorandum (TM) 2.3.2 Structure Design Loads R2 (April 20, 2011) defines the following hierarchy of structure types:

- Primary structures (structures that directly support the HSR tracks).
- Secondary structures (all other structures).

Primary structures are subdivided by importance into the following:

- Important structures (structures designated by the Authority to be important).
- Ordinary structures (all other structures).

Primary structures are also classified by technical complexity in TM 2.10.4 Seismic Design Criteria R1 (May 26, 2011) as follows:

- Complex structures – structures that have complex response during seismic events through one or more of the following:
  - Irregular geometry.
  - Unusual framing.
  - Long spans.
  - Unusual geologic conditions.
  - Close proximity to hazardous faults.
  - Regions of severe ground motion.
- Standard structures – structures that are not complex structures and comply with the pending CHSTP Guidelines for Standard Aerial Structures.
- Nonstandard structures – structures that do not meet the requirements for either standard or complex structures.

Table 1.3-1 lists the structures in CP4 of the Fresno to Bakersfield Section of the HSR, and indicates their classification under the above system.

Table 1.3-1
Mainline Structure Key Data and Classification

No.	Purpose (e.g., span over river, local roads)	Alignment	Location (beg. station)	Structural Type (e.g., balanced cantilever)	Length (ft.)	Max. Column Height (ft)	No. of Bents	No. of Spans	Clearances to Local Facilities	Structure Classification
1	Retaining Wall	L1	5191+50	MSE Wall (Retained Embankment)	3390	N/A*	N/A	N/A	N/A	Nonstandard
2	Poso Creek Bridge	L1	5225+40	Standard Viaduct	240	24′-6″	1	2	Poso Creek 8′-0″	Standard
5	Retaining Wall	L1	5227+80	MSE Wall (Retained Embankment)	4380	N/A	N/A	N/A	N/A	Nonstandard
6	Retaining Wall	WS1	5551+00	MSE Wall (Retained Embankment)	540	N/A	N/A	N/A	N/A	Nonstandard
7	Paso Robles Hwy (SR46) Underpass	WS1	5555+88	Standard Viaduct	240	23′-7″	1	2	SR 46 16′-7″	Standard
8	Retaining Wall	WS1	5557+60	MSE Wall (Retained Embankment)	720	N/A	N/A	N/A	N/A	Nonstandard
9	Wasco Viaduct	WS1	5564+80	Standard Viaduct	9650	28′-8″	83	83	6th St 16′-9″ Poso Ave 20′-6″	Standard
10	Wasco Crossover (Part of Wasco Viaduct BNSF Crossing)	WS1	5661+30	Crossover Beam/Slab Structure	1326	N/A	N/A	N/A	BNSF 25′-7″	Nonstandard
11	Wasco Viaduct	WS1	5674+56	Standard Viaduct	839	30′-1″	7	7	N/A	Standard
12	Retaining Wall	WS1	5682+95	MSE Wall (Retained Embankment)	2655	N/A	N/A	N/A	N/A	Nonstandard
13	Kimberlina Road Underpass	WS1	5715+96	PC Concrete "bathtub" Beams	68	N/A	0	1	Kimberlina Road 16′-6″	Nonstandard
14	Retaining Wall	WS1	5928+55	MSE Wall (Retained Embankment)	2675	N/A	N/A	N/A	N/A	Nonstandard
15	Shafter Viaduct	WS1	5955+30	Standard Viaduct	3940	32′-9″	35	35	N Shafter Ave 18′-3″ E Tulare Ave 19′-10″ Central Ave 28′-2″ Mannel Ave 29′-3″	Standard
16	Lerdo Hwy Crossing (Part of Shafter Viaduct)‡	WS1	5994+70	Continuous Concrete Box Girder	585	28′-4″	3	4	E Lerdo Hwy 24′-6″ BNSF 28′-11″	Complex
17	Shafter Viaduct	WS1	6000+55	Standard Viaduct	220	32′-4″	3	2	N/A	Standard
18	BNSF Spur Crossing (part of Shafter Viaduct)	WS1	6002+75	Continuous Concrete Box	360	32′-8″	2	3	BNSF 29′-1″	Complex

No.	Purpose (e.g., span over river, local roads)	Alignment	Location (beg. station)	Structural Type (e.g., balanced cantilever)	Length (ft.)	Max. Column Height (ft)	No. of Bents	No. of Spans	Clearances to Local Facilities	Structure Classification
19	Shafter Viaduct	WS1	6006+35	Standard Viaduct	2400	42′-3″	21	20	N/A	Standard
20	S Beech Ave Crossing (part of Shafter Viaduct)	WS1	6030+35	Continuous Concrete Box Girder	390	26′-3″	2	3	S Beech Ave 25′-3″ E Los Angeles Ave 25′-3″	Complex
21	Shafter Viaduct	WS1	6034+25	Standard Viaduct	240	32′-11″	3	2	N/A	Standard
22	Shafter Crossover (part of Shafer Viaduct BNSF Crossing)	WS1	6036+65	Crossover Beam/Slab Structure	2240	N/A	N/A	N/A	BNSF 28′-8″	Nonstandard
23	Shafter Viaduct	WS1	6059+05	Standard Viaduct	4420	35′-0″	39	38	BNSF 27′-10″	Standard
24	Lone Star Spur Crossing (part of Shafter Viaduct	WS1	6103+25	Continuous Concrete Box Girder	520	23′-11″	2	3	Proposed Lone Star Spur Realignment 24′-11″	Complex
25	Shafter Viaduct	WS1	6108+45	Standard Viaduct	880	34′-1″	8	8	Cherry Ave 29′-10″	Standard
26	Retaining Wall	WS1	6117+25	MSE Wall (Retained Embankment)	3375	N/A	N/A	N/A	N/A	Nonstandard

*N/A indicates where information required is not applicable to the structure, e.g., bents and spans for retaining walls.

1.4 Overall Design Assumptions for Preliminary Design

In carrying out the analysis of complex and nonstandard structures, the Regional Consultant (RC) has concentrated on the key aspects of the design stated in the analysis scope. These aspects are determined in many cases by satisfying the requirements of the relevant design criteria.

For the bridge structures, the requirements include the following:

- Structural adequacy.
- Seismic performance as specified in the seismic design criteria.
- Interaction between track and structure to ensure that adequate provision is made for relative and absolute displacements between track and structure.
- Constructability and assumed construction method.
- Design economy.

1.4.1 Structure Descriptions

The RC has identified the following complex and nonstandard structures as representative examples of the structure types within CP4 of the CHSTP:

- Wasco Crossover Structure.
- Shafter Crossover Structure.
- Lone Star Spur Crossing.

None of the complex and nonstandard structures on the preferred alignment of CP4 were designated as structures for detailed analysis.

Analysis of nonstandard and complex structures took place at a time when the preferred route option, or Least Environmentally Damaging Practicable Alternative (LEDPA), had not yet been selected. None of the nonstandard and complex structures designated for detailed analysis are within the CP4 alignment (Table 1.2-1). Therefore, all nonstandard and complex structure analysis has been completed and discussed in previous package structures report submittals. The structures reports and calculations for similar structures in previous packages are referenced within this report to support the design of the nonstandard and complex structures in CP4.

The Wasco Crossover Structure is a complex section of the Wasco Viaduct where the HSR crosses over the BNSF line at a high skew (Row 10 in Table 1.3-1). To the north and south are standard viaducts. The crossover structure is conceived as a slab supported on multiple columns to either side of the BNSF railroad corridor. The slab section is assumed to be constructed by placing precast beams across the railroad on deep in situ concrete column cap beams that run parallel to the railroad. The 6-foot-diameter columns are positioned at 30-foot centers along the length of the structure and are founded on a single 9-foot-diameter pile. Pile stiffness is described in Appendix A.

The Shafter Crossover Structure is a complex section of the Shafter Viaduct where the HSR crosses over the BNSF line at a high skew (Row 22 Table 1.3-1). To the north and south are standard viaducts with segments of multiple balance cantilever spans. The crossover structure is conceived as a slab supported on multiple columns to either side of the BNSF railroad corridor. The slab section is assumed to be constructed by placing precast beams across the railroad on deep in situ concrete column cap beams that run parallel to the railroad. The 6-foot-diameter columns are positioned at 30-foot centers along the length of the structure and are founded on a single 9-foot-diameter pile. Pile stiffness is described in Appendix A.

Both the Wasco Crossover Structure and Shafter Crossover Structures have a maximum span of 115 feet nearly perpendicular to the railroad and a length of 1,326 feet and 2,240 feet, respectively. The elevated slab crossover structure's design is based on the results of the structural analysis of the nonstandard Conejo Crossover Structure. The Conejo Crossover Structure has a maximum span of 115 feet and is 1,429 feet long. Appendix B demonstrates that the Conejo Crossover Structure satisfies all of the HSR design criteria. It is assumed that the Wasco Crossover Structure and the Shafter Crossover Structure, which have the same material and cross-section definitions with the same maximum span, can also be designed to satisfy all of the HSR design criteria. Appendix C contains the structure calculations of the Conejo Crossover Structure.

The viaduct over the proposed Lone Star Spur Realignment (Row 24 in Table 1.3-1) is a three-span continuous concrete box girder frame and represents all continuous segments of the Shafter Viaduct. This Lone Star Spur Crossing is a complex structure because of its long span of 232 feet. The adjacent spans on either side are 145 feet and 143 feet. The structure supports two HSR tracks and is comprised of a single cell box girder with variations in depth. The depth of the superstructure is designed in compliance with the span to depth ratio presented in TM 2.3.3. Other instances of continuous concrete box girder segments of Shafter Viaduct are the Lerdo Highway Crossing, BNSF Spur Crossings, and Beech Avenue Crossing with maximum spans of 190 feet, 140 feet, and 150 feet, respectively (Rows 16, 18 and 20 in Table 1.3-1). The Lone Star Spur Crossing is the longest and therefore most onerous of the complex balance cantilever crossings along the CP4 preferred alignment. Each of the aforementioned structures is described in its respective section of this report.

1.4.2 Seismic Performance

The seismic design criteria specified in TM 2.10.4 gives the requirements for assessment of the seismic performance of structures. The seismic design criteria define the two design-level earthquakes as follows:

- Maximum Considered Earthquake (MCE) – ground motions corresponding to greater of
    - (1) a probabilistic spectrum based upon a 10% probability of exceedence in 100 years (i.e., a return period of 950 years with 5% damping) and
    - (2) a deterministic spectrum based upon the largest median response resulting from the maximum rupture (corresponding to Mw) of any fault in the vicinity of the structure.
- Operating Basis Earthquake (OBE) – ground motions corresponding to a probabilistic spectrum based upon an 86% probability of exceedence in 100 years (i.e., a return period of 50 years with 5% damping).

In terms of acceptability of the design, the requirements relating to seismic performance are the Operability Performance Level (OPL) under the action of the OBE and No-Collapse Performance Level (NCL) under the action of the MCE.

These performance levels imply the following:

- OPL at OBE:
    - Minimal impacts to HSR operations.
    - No spalling of concrete.
    - Minimal permanent deformations.
- NCL at MCE:
    - No collapse.
    - Significant yielding of reinforcing steel.
    - Extensive cracking and spalling of concrete but minimal loss of vertical load-carrying capacity in columns.
    - Large permanent deflections.

Response spectra for design of the route from Merced to Bakersfield have been the subject of a separate study (Kleinfelder – Ground Motions for Preliminary Design of California High Speed Rail Project, Seismic Ground Motion Zone Map). The design spectra relevant to CP4 lie within Zone 5 of this study. These acceleration response spectrum curves have been reproduced in Figure 1.4-1. It is expected that the finalized acceleration response spectrum curves and design criteria will be provided to contractors for the subsequent design development stages.

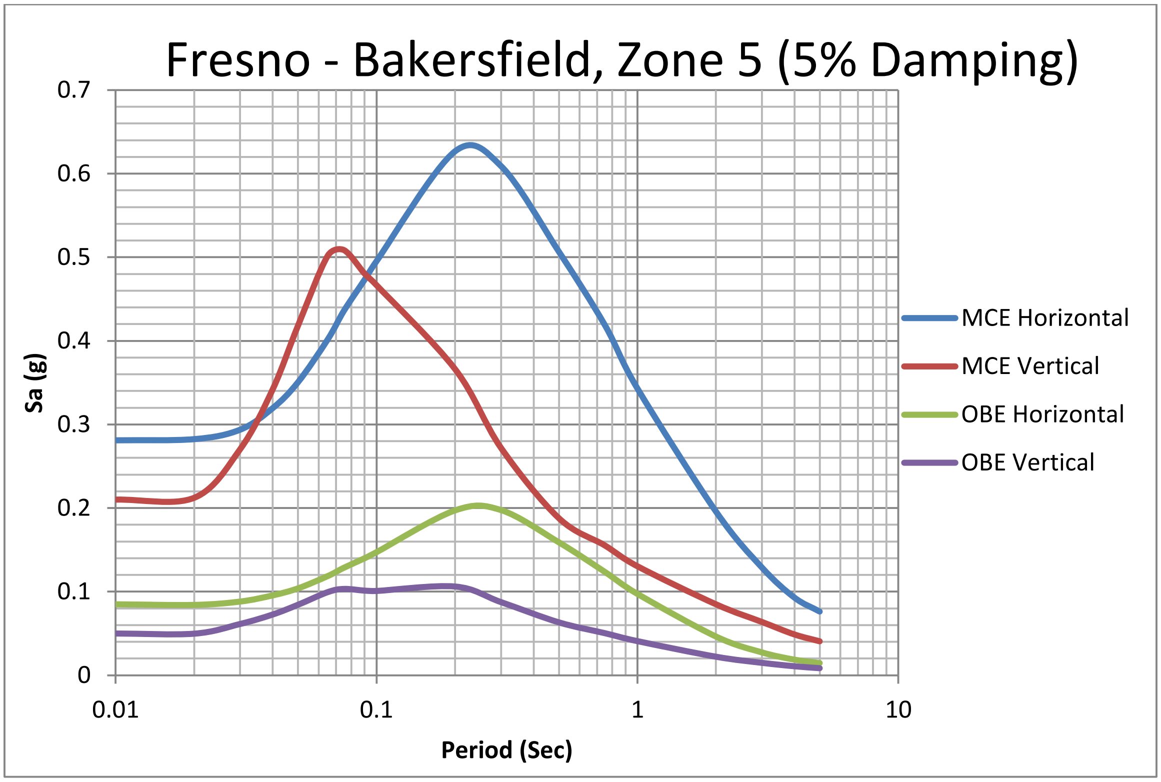

Figure 1.4-1
Design Response Spectra (Zone 5)

For Zone 5, the peak horizontal ground acceleration (PGA) has been taken as the acceleration that corresponds to a period of 0.01 seconds — that is 0.0848 g at OBE (green curve) and 0.2810 g at MCE (blue curve). As these accelerations are less than 0.35g, in accordance with TM 2.9.10 Geotechnical Analysis and Design R1 (May 22, 2011) clause 6.10.13, additional earthquake pressures can be disregarded for the design of buried structures, provided that design for "at-rest" pressures is undertaken.

1.4.3 Dynamic Performance

The representative structures have been analyzed to determine fundamental frequencies for primary modes of vibration. The frequencies have been checked for compliance with the requirements of TM 2.10.10, and it was found that there was no need to perform a dynamic structural analysis using actual high-speed trains for the preliminary design stage. A dynamic time history analysis has been performed in accordance with the track-structure interaction requirements of TM 2.10.10.

1.4.4 Track Structure Interaction

Track structure interaction analyses have been conducted for the selected typical structures to confirm feasibility of the structure form.

The structures analyzed demonstrated that the concepts are feasible and do not require rail expansion joints, do not require Zero Longitudinal Resistance (ZLR) track clips, and are capable of being developed to final design.

1.5 Geotechnical Assumptions Made for Preliminary Stage Design

The recommendations of the Geotechnical Design Memorandum (included as Appendix A) have been followed, including the following:

- Soil parameters (γ_b, Ø, c_u).
- Assumed groundwater levels.
- The requirements of TM 2.3.2.

As no borehole investigation results are available for the FB Section, geotechnical advice was based on historic borehole records from California Department of Transportation (Caltrans) projects located in the vicinity of the route. The foundation spring stiffness used in the structural analysis has been based on a conservative interpretation of the soil parameters indicated by the borehole logs. The derivation of the stiffness matrices for the piles is included with the *Geotechnical Data Report*.

1.6 Further Information Required to Develop the Design

It is expected that the DB contractor will want more detailed factual information in order to address key design issues.

The data required includes, but is not limited to, the following:

- Borehole log details at each structure.
- Results of soils testing.
- Results of long-term monitoring of groundwater levels.
- Detailed knowledge of access routes and timing of access to site.
- Utilities information locations, depths, and risk.
- Details of working space adjacent to the BNSF for beam storage and site operations.
- Details of BNSF timetables for scheduling beam erection and other activities potentially impacting railroad operations.
- Construction constraints for working in floodplain areas and major river channels.
- Details of predicted regional subsidence.

1.7 Analysis Methodology

The assessment of HSR structures is concerned with both the adequacy of the structural members and also the serviceability of the structure and its response to dynamic train loading. In addition to the structural members, stresses in the rails are of particular importance, to ensure that the design is compatible with the use of continuously welded rails, which is the preferred rail concept.

HST structures must meet all of the following aspects of design:

- Dynamic behavior.
- Track-structure interaction criteria.

- Rail serviceability criteria.
- Member capacity.
- Seismic performance.

The preliminary design of the structure encompasses all of these aspects, ensuring that the worst effects are considered in each case. This has been achieved by creating multiple structural models using SAP2000 V14 (SAP) and CSiBridge V1520 (CSiBridge) analysis programs, with each model being configured with unique properties and load cases to capture the most onerous effects.

The performance of the structure and its acceptance is measured against the criteria given in Draft TM 2.10.10: Track-Structure Interaction R1 (February 29, 2012), American Association of State Highway and Transportation Officials (AASHTO) design codes, Caltrans Amendment to AASHTO LRFD, and Caltrans-specific design criteria. Structural loads are outlined in TM 2.3.2: Structure Design Loads R2 (April 20, 2011). Project-specific seismic design criteria are given in TM 2.10.4 Seismic Criteria R1 (May 26, 2011).

To envelope the worst cases, upper-bound and lower-bound model configurations have been utilized. The “soft” case considers a lower-bound model stiffness and upper-bound mass, whereas the “stiff” case considers an upper-bound model stiffness and lower-bound mass. These configurations are defined in TM 2.10.10 Track Structure Interaction R0 as Conditions 1 and 2 respectively.

1.7.1 Model Stiffness

The model stiffness is controlled through modification of the section properties. The soft model considers the cracked section properties of reinforced concrete members and nominal material properties. The stiff model considers gross section properties but takes expected material properties, rather than nominal.

Cracked section properties are derived from either the slopes shown in Figure 5.3 of the Caltrans Seismic Design Criteria (CSDC) or from a moment-curvature analysis. The moment-curvature relationship for reinforced concrete sections is determined using the Section Designer module in SAP, by specifying an appropriate amount of reinforcement and axial load. Cracked properties are represented in the model by factoring the moment of inertia of the gross section properties, I_g. Typically the cracked stiffness ranges between 30% and 40% of the gross section stiffness. However, higher values can be justified with increased reinforcement.

The increased flexural stiffness due to expected material properties is represented in the model by factoring the properties of the gross section. The CSDC defines the expected compressive strength of concrete as being 30% greater than the nominal strength, for concrete strengths of 4ksi or higher. For normal weight concrete, this equates to an increase in the elastic modulus of 14%. In order to attribute cracked properties to flexural stiffness only, this factor is applied to the moment of inertia of the gross section, rather than the elastic modulus.

1.7.2 Model Mass

The mass which contributes to the modal and seismic analysis cases consists of the mass of the structural elements and the mass of the prospective train vehicle. The mass of footings and components below ground level have been omitted from the analysis.

Train loads are accompanied by an equivalent train mass, which acts at a distance of 8 feet above rail level. The definition of these loads has been configured so that they are attributed to the mass of the model only and are not included in any load cases.

For the purposes of upper-bound (stiff) and lower-bound (soft) model configurations, the total mass used in the analysis is controlled using the model mass definition function of SAP. The stiff model applies a 5% reduction to the total mass, whereas the soft model applies a 5% increase to the total mass.

A summary of model properties is as follows:

- Condition 1 (soft).
  - Lower-bound stiffness – uses cracked sectional properties for concrete members and nominal material properties.
  - Upper-bound mass – model/train mass increased by 5%.
- Condition 2 (stiff).
  - Upper-bound stiffness – uses gross sectional properties and expected material properties for concrete members.
  - Lower-bound mass – model/train mass decreased by 5%.

1.7.3 Boundary Conditions

In order to accurately represent the contribution of adjacent structures to the behavior of the HSR structure under consideration, boundary conditions are imposed in the model. For the case of structures which form part of a longer aerial viaduct, the approaching spans adjacent to the HSR structure are also modeled; typically 10 viaduct spans on either side.

For structures bounded by abutments and tracks on embankment, guidance is given in TM 2.10.10 regarding the required length of track extended away from the structure, which is dependent on the at-grade track type and properties of the rail fasteners.

Specific boundary conditions for each structure are discussed in their respective sections.

1.7.4 Foundation Properties

Foundations are modeled using pile springs, with the stiffness properties of each spring derived from historic ground investigation (GI) results and more recent GI results where possible. The stiffness matrix of the pile springs used in the models is derived using LPile, which simulates the performance of the soil/pile system, an approach further detailed in Appendix A of the GDM.

Group reduction factors have been applied to the pile stiffness matrix where necessary.

1.7.5 Rail Clip Properties

Rail clip properties vary depending upon the loaded or unloaded condition. In both cases the vertical stiffness is constant, and is equivalent to a 4000k/ft per foot of track. The transverse stiffness is also constant and is equivalent to 450k/ft per foot of track. In the longitudinal direction however, the rail clip stiffness is modeled as a bilinear coupling spring between the track and superstructure, the properties of which are shown in Figure 1.7-1. The rail clips are typically spaced at 27-inch centers and so the stiffness values mentioned are modified accordingly to give an equivalent stiffness. See TM 2.10.10 for further details.

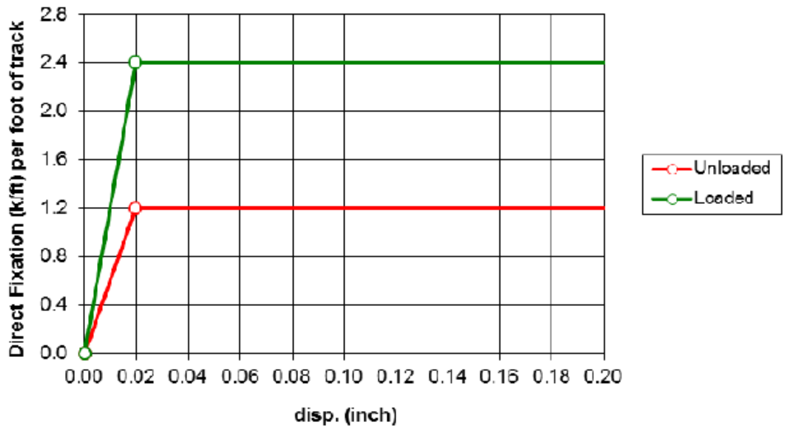

Figure 1.7-1
TM 2.10.10: Bilinear Coupling Spring Stiffness

Depending upon the position of the live load on the structure, the rail clip properties are modified to match those that are considered loaded — those beneath the train load — and those that remain unloaded.

At model boundaries, the horizontal boundary spring has stiffness and yield properties which represent the capacity of an infinite number of elastic fasteners. These stiffness and yield values are obtained from TM 2.10.10 and are dependent on the at-grade track type and rail fastener properties.

1.8 Dynamic Behavior

Frequency analysis is used to ensure that the structure is proportioned to resist resonance effects and that the code-prescribed values relating to the dynamic amplification of loads remain applicable. The three specific frequencies of interest are the vertical, torsional, and transverse frequencies.

Vertical and torsional frequencies are investigated on both the soft and stiff models. TM 2.10.10 gives limits to these frequencies for both the upper-bound and lower-bound cases, of which the limits are dependent on the span lengths and the support conditions. Transverse frequencies are evaluated only with the soft configuration, with the added condition that the structure is fully fixed at the bearings so that only the flexibility of the superstructure is considered.

1.9 Track/Structure Interaction and Rail Serviceability

The structure is required to meet both track structure interaction and rail serviceability criteria in order to ensure that structural deformations and adverse dynamic effects due to a moving train load are limited. These effects include excessive rail stresses, excessive structure deformations, the risk of train derailment due to relative twisting or misalignment of the rails, rail break, excessive rail or track wear, and poor track maintenance.

Several load permutations are evaluated, with each case having specific limits of acceptance. These cases are defined as groups and they vary by the number of loaded tracks, the consideration of traction, braking and centrifugal forces, thermal effects, and the occurrence of a seismic event. Note that only OBEs, as defined in TM2.10.4, are considered for the assessment of track-structure interaction and rail serviceability.

The following is a summary of the load cases evaluated for the track-structure interaction (Groups 1-3) and rail serviceability (Groups 4 and 5):

- Group 1a: $(LLRM + I)_1$
- Group 1b: $(LLRM + I)_2 + CF_2$
- Group 1c: $(LLRM + I)_m + CF_m$
- Group 2: $(LLRM + I)_1 + CF_1$
- Group 3: $(LLRM + I)_1 + CF_1 + OBE$
- Group 4: $(LLRM + I)_2 + LF_2 \pm T_D$
- Group 5: $(LLRM + I)_1 + LF_1 \pm 0.5T_D + OBE$

Where:

- LLRM = Live Load from Modified Cooper E-50 train
- LLRR = Maintenance and construction train load (Cooper E-50)
- $(LLRM + I)_1$ = one track of LLRM plus impact
- $(LLRM + I)_2$ = two tracks of LLRM plus impact
- $(LLRM + I)_m$ = multiple tracks per TM 2.10.10 Section 6.9.3 of LLRM plus impact
- LLRM = modified LLRR live load
- I = vertical impact factor
- CF_1 = centrifugal force (one track)
- CF_2 = centrifugal force (two track)
- OBE = Operability Based Earthquake (OBE)
- LF_1 = braking forces
- LF_1 = braking and traction forces
- T_D = temperature differential

Note that loads not applicable, e.g., water loads, have been omitted from these definitions.

These models are identical with the exception of the rail clip stiffness assignments (see 4.1.3), the location of the train mass assignments, and the location of the applied live/braking/traction loads.

All structures have been sized to comply with the frequency limits of TM 2.10.10. It has therefore not been necessary to carry out a dynamic analysis with actual high-speed trains to demonstrate compliance with vertical deck acceleration limits.

Note that trainset details, including the mass, stiffness, and damping characteristics of the trainsets have not been made available at the time of preliminary design. Passenger comfort analyses have therefore not been investigated.

1.9.1 Displacement Model Configuration

As maximum displacements present the worst case, the soft configuration — lower-bound stiffness and upper-bound mass — is of most interest.

In the analysis, train locations have been chosen to envelope the most onerous effects on the structure. For the case of rail serviceability, the locations selected are those that will develop the highest displacements and rotations at the structure expansion joints and thus produce the worst cases, both in terms of deflection and rail stresses. As such, several models are required, each one denoted by either the specific live-load location (Position A, B, etc.) or the expansion joint under consideration (Abutment 1 or Bent 11, for example). See Figure 1.9-1 for a typical displacement model live-load layout.

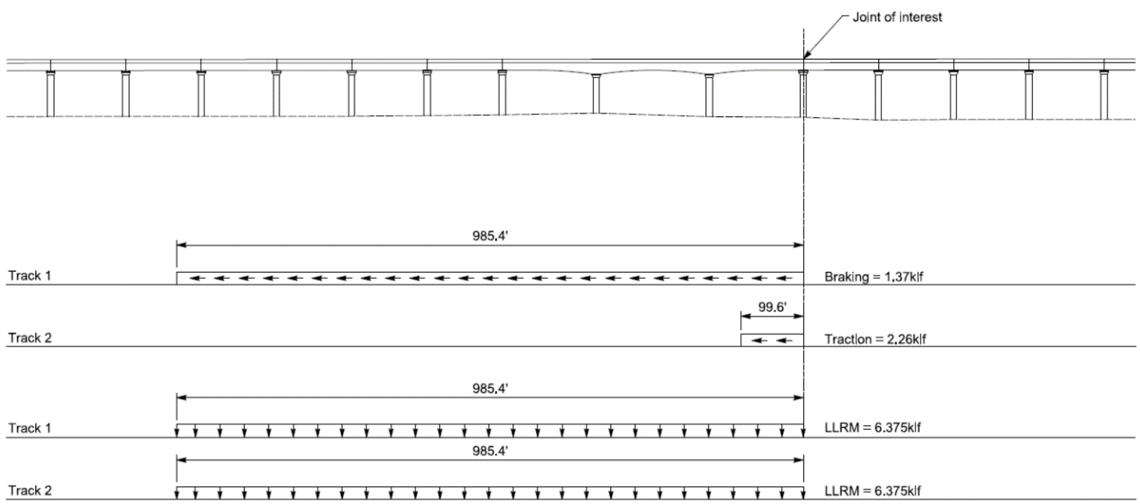

Figure 1.9-1
Typical Displacement Model Live-Load Layout

1.10 Member Capacity

The RC has assessed the structural adequacy of each HSR structure against the requirements of AASHTO (with Caltrans amendments) in addition to the CSDC. For the purpose of preliminary design, only the key structural members have been checked. Ancillary components such as shear keys and connections have not been reviewed in any detail, and it is expected that these will be verified at the detailed design stage. In the case of the crossover structure, however, the integral connection between the column/edge beam/joist has been checked to verify the adequacy of load transfer in the joint during a seismic event.

The key members checked are as follows:

- Superstructure.
  - Steel truss members and beams (SAP steel section designer).
  - Reinforced concrete beams (SAP concrete section designer and/or hand calculations).
  - Reinforced concrete deck slab (SAP concrete designer for 2D shell elements and/or hand calculations).
- Substructure.
  - Reinforced concrete columns (SAP concrete section designer).
- Foundations.
  - Reinforced concrete pile caps (hand calculations).
  - Reinforced concrete piles (hand calculations).

The in-built section designer functions of SAP and CSiBridge check the elements for adequacy based upon preselected load cases. The primary load cases of interest are Strength 1 which accounts for ultimate temporary loads (live and thermal), and Strength 5 which is the OBE seismic case as defined in TM 2.3.2:

- Strength 1: $1.25/0.9DC + 1.75(LLRR+IM)_2 + 1.2/0.5TU$
- Strength 5: $1.25/0.9DC + 0.5(LLRR+IM)_1 + 1.1OBE$

Where:

- DC = dead load of structural components and permanent attachments

- LLRR = Maintenance and construction train load (Cooper E-50)(LLRM + IM)$_1$ = one track of LLRM plus impact
- (LLRM + IM)$_2$ = two tracks of LLRM plus impact
- IM = vertical impact factor
- TU = uniform temperature effects
- OBE = Operating Basis Earthquake

1.10.1 Ductile and Capacity Protected Components

MCE events, accounted for in the Extreme 3 load case, are not directly considered as part of the member capacity check. Plastic hinging mechanisms occurring in the columns will protect the adjacent components from excessive loading during an MCE. These components are therefore designed for the potential overstrength moments and forces that may be transferred due to the plastic hinging, where the overstrength moment is defined as the plastic moment capacity of the hinging member, multiplied by 1.2. An associated overstrength shear force is also considered and is taken as the overstrength moment, divided by the height of the column; or in the case of plastic hinges being located at both the base and top of the column, the moment divided by half of the column height.

The plastic moment of the column is calculated using a moment curvature (M-ϕ) analysis with the Caltrans idealized curve, as defined in Section 3.3.1 of the CSDC. The axial load used to derive the M-ϕ relationship is taken as the nominal axial load in the column due to dead loads, superimposed dead loads, and overturning effect for multicolumn bent.

In cases where columns have been demonstrated to remain elastic during an MCE, the use of overstrength forces for the design of capacity protected members is considered to be overly conservative. In these cases, the plastic moment capacity and associated shear of the hinging member alone is deemed sufficient for the assessment of adjacent members.

Columns with plastic hinges are assessed both for elastic capacity in the force models, as well as inelastic capacity and ductility with pushover models (see Section 1.4.2).

1.10.2 Force Model Configuration

Unlike the track-structure interaction models, where maximum displacements are desired, the approach with the capacity check is to configure the models so as to maximize the forces in the members. The modeling properties are therefore similar to the "stiff" models used during the track-structure interaction assessment, on the basis that stiffer elements experience increased force demands. For force models, a nominal mass was assumed instead of an upper-bound mass.

Train locations have been selected to generate the highest member forces. From the perspective of the columns, the most onerous load configuration is that which exerts the most horizontal force at the top of the column, thus exerting the highest shear forces and moments.

By comparison, and considering the load combinations given in TM 2.3.2, the forces imposed in the longitudinal direction due to traction and braking are the most onerous. A staggered train arrangement is therefore adopted, where the one train in braking is centered over the column/bent of interest and the other train with traction is located so that the traction portion is situated over the column/bent of interest (see Figure 1.10-1).

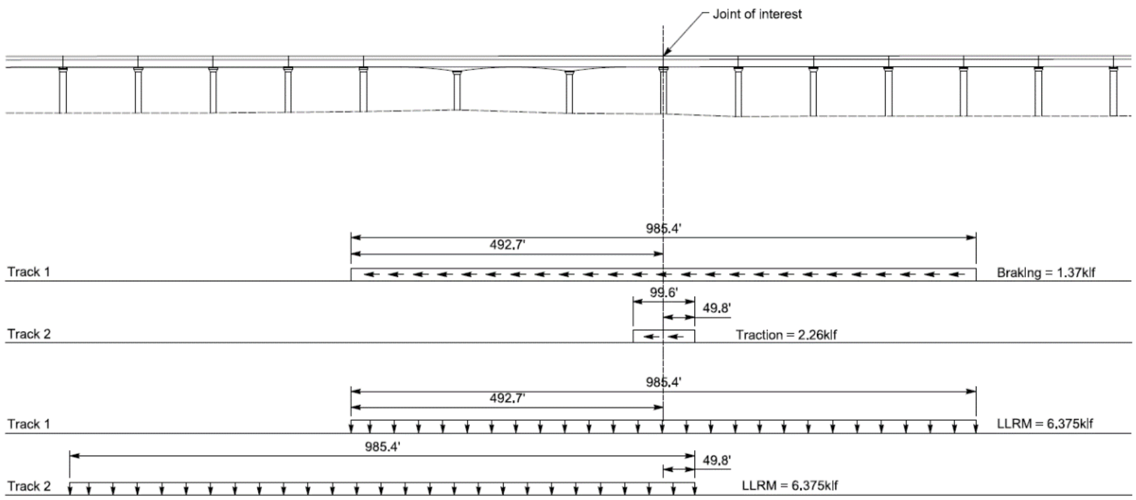

Figure 1.10-1
Typical Force Model Live Load Layout

1.10.3 Redundancy Check

In the case of truss structures, an additional check is undertaken to evaluate the structure's performance with one of the diagonal members removed. This is a redundancy check with a requirement that the structure will not collapse under this condition. Again the in-built section designer module of SAP and CSiBridge was used; however, this considers only elastic capacity, which is conservative. Under the no-collapse performance requirement under this check, consideration of plastic capacity of the members could be warranted. This may be investigated further during detailed design.

1.11 Seismic Performance

The seismic performance of the structure is outlined in TM 2.10.4 and also the CSDC. During an OBE event, the structure is required to remain elastic and this check is made during the member capacity check in the force models. During an MCE event, a no-collapse condition is required, which requires an assessment of the hinging mechanisms and ductility of the structure.

Plastic hinges are assigned to certain locations of the structure in order to control the method of structural failure and also to limit the forces/moments transferred to components where it is desirable to have them capacity-protected, e.g., footings. In reinforced concrete columns, plastic hinges are located at the base, with additional hinges placed at the tops of the columns in the case of the crossover structures. Hinge lengths and properties are determined in accordance with the CSDC.

To satisfy the OBE seismic performance criteria, it must be shown that the plastic hinges will not develop during an OBE event, which is demonstrated during the member capacity check by ensuring that the columns remain elastic.

During an MCE event, the hinges develop and become inelastic and their behavior is then assessed using global and local pushover analyses in SAP. The two criteria of interest are specified in the CSDC as the Displacement Ductility Demand and the Displacement Ductility Capacity, which are the global and local member checks, respectively.

1.11.1 Displacement Ductility Demand

The Displacement Ductility Demand is the measure of the member ductility after hinging has occurred. It is given by the following relationship:

- $\mu_D = {\Delta_D}/{\Delta_{Y(i)}}$

Where:

- Δ_D = global displacement
- $\Delta_{Y(i)}$ = yield displacement

The global displacement, Δ_D, is the displacement of the column/bent during an MCE event taken at the tops of the columns and is determined by applying the MCE time history cases to the full structural model in SAP or CSiBridge. Hinge properties are assigned to the columns in the desired locations so that inelastic displacements are also taken into account. To conservatively take the maximum displacements under MCE loading, the "soft" model configuration was used; however, train loads/masses were not considered.

The yield displacement, $\Delta_{Y(i)}$, is determined from a pushover analysis in both the longitudinal and transverse directions. The analysis applies accelerations to the model in progressive steps and displays the status of the hinge at each step. At the point that the hinge yields, the displacement at the top of the column is recorded and taken as $\Delta_{Y(i)}$. To conservatively take the minimum displacements that relate to column hinging, the stiff model configuration was used.

In the crossover structures, there are many columns that are seen to yield at different pushover steps. In this case, the pushover step that presents the first column yield is taken as the reference and only those columns that yield during this step are reviewed for displacement ductility.

The target displacement ductility demand varies depending on the support condition and fixity, but is < 4 and <5 for single and multicolumn bents respectively. Displacement ductility less than 1 indicates that the column remains elastic during the MCE event.

1.11.2 Displacement Ductility Capacity

The displacement ductility capacity is a local check of the column ductility irrespective of foundation and superstructure flexibility. It is given by the following relationship:

- $\mu_C = {\Delta_C}/{\Delta_Y^{col}}$

Where:

- Δ_C = collapse displacement
- Δ_Y^{col} = yield displacement

The pushover analysis is undertaken on a local model of the column bent with fixities assigned to represent the assumed fixities of the superstructure and foundations. Typically the foundations are assumed to be fully fixed so the bases of the columns in the local model are rigid. The fixities at the top of the column vary depending upon the expected behavior and will typically be free if the column is assumed to act as a cantilever or rotationally fixed if the column is part of a frame or multicolumn bent. No translational restraints are applied to the tops of the columns.

The pushover analysis is conducted in both the longitudinal and transverse directions, and in each case the displacements of the columns are recorded for the initial yield and the collapse stages of the hinges. Displacement ductility capacity is discussed on a case-by-case basis in other sections.

1.12 Emergency Egress and Escape Provision

Provision for emergency access will be made in accordance with TM 2.8.1 Safety and Security Design Requirements R0 (March 12, 2012), TM 2.3.3 HST Aerial Structure R0 (June 2, 2009), NFPA130 and NFPA101. Emergency access points are required at maximum 2,500-foot intervals along aerial structures with access stairs to be located every 2.5 miles. It is also a requirement that access to the trackside is provided at each systems site which are also at approximately 2.5-mile intervals. Therefore, access stairs have been provided at each systems site and emergency ladder access turnarounds are provided at 2,500-foot nominal centers between systems sites. Due to the length of the Wasco and Shafter viaducts and the spacing of access stairs on the route, additional access stairs are not required on any of the nonstandard and complex structures for CP4. Table 1.12-1 and Table 1.12-2 identify the access locations designated on the drawings for the Wasco Viaduct and Shafter Viaduct, respectively.

Table 1.12-1
Wasco Viaduct Access Locations

STA	Locale	Egress features
5569+00 to 5624+00	G St	Ladder Access via public street
5649+00	East of access road off of State Route 43 Between Filburn Ave and Wasco Crossover Structure*	Access stairs to trackside for systems site
5674+00	Adjacent to Wasco Ave	Ladder Access Turnaround

Notes.
* Two alternative locations for systems sites are indicated on the drawings.

Table 1.12-2
Shafter Viaduct Access Locations

STA	Locale	Egress features
5946+50	Along Shafter Viaduct Retaining Wall Approach	Access stairs to trackside for systems site
5959+00 to 5993+00	Walker St	Ladder Access via public street
6010+00	Near BNSF Yards	Ladder Access Turnaround
6035+00	Between S Beech Ave Crossing and Shafter Crossover Structure*	Access stairs to trackside for systems site
6037+00 to 6089+00	Realigned Santa Fe Way	Ladder Access via public street
6110+00	Cherry Ave	Ladder Access via public street

Notes.
* Two alternative locations for systems sites are indicated on the drawings.

1.13 Inspection, Service, and Maintenance Access

Both the standard viaduct and long-span continuous structures will be a simple concrete box section which can be inspected from both inside and outside. Inspection hatches will be located near the ends of girders.

The crossover beams are envisioned to be placed immediately adjacent to one another and cast into the edge beam at their ends. These are unlikely to be inspectable as they will also be over the BNSF corridor and they should be designed with this in mind. There will need to be an agreement between the Authority and the BNSF to provide access for future inspection and maintenance during non-revenue hours.

Externally, the crossover structure will be inspectable with the use of hydraulic access platforms either from grade or above.

1.14 Utilities Affected and Disposition

Refer to composite utility plans.

1.15 Noise Mitigation and Acoustic Treatment

No specific features have been included to mitigate the noise generated by the passage of trains. However, this is a rural area and it is considered unlikely that there will be many noise-sensitive receptors sufficiently close to the structure to benefit from mitigation measures. The viaduct parapets are capable of carrying noise barriers if mitigation is required.

1.16 Compliance with System-Wide Bridge Aesthetics Features

TM 200.06, "Aesthetic Guidelines for Non-Station Structures", provides guidance on the appearance targets for the CHSTP. The scheme detailed and analyzed on the PE4P drawings represents the functional baseline case on which the DB contractors are encouraged to improve in discussion with the Authority.

1.17 Geotechnical Parameters Used for Design

The geotechnical parameters are described in the Geotechnical Design Report attached at Appendix A.

Section 2.0

Wasco Crossover Structure

2.0 Wasco Crossover Structure

The Wasco Viaduct is 11,815 feet in length and composed of three sections: the northern standard viaduct, the BNSF crossing, and the southern standard viaduct (RS 15% Drawings). The BNSF crossing structure is considered to be nonstandard and complex, and is the subject of this analysis.

Analysis of nonstandard and complex structures took place at a time when the preferred route option, or LEDPA, had not yet been selected. None of the nonstandard and complex structures designated for detailed analysis are within the CP4 alignment (Table 1.2-1). Notwithstanding this, the behavior of the Conejo Crossover Structure is considered to be representative of similar crossover structures on the selected preferred alignment. As the Conejo Crossover Structure satisfies all of the HSR design criteria, as seen in Appendix B, the Wasco Crossover Structure, which is of similar width, can also be designed to satisfy these criteria.

2.1 Structure Form

The BNSF Crossing portion of the Wasco Viaduct is conceived as a 1,326-foot-long elevated slab, supported on multiple columns to either side of the BNSF railroad corridor. The 6-foot-diameter crossover columns are positioned at 30-foot centers along the length of the structure and are founded on a single 9-foot-diameter drilled shaft pile.

The slab section is constructed from 6-foot-deep, precast, prestressed concrete (PC) beams and supported on 12-foot-deep by 30-foot-span in situ concrete column cap beams, which run parallel to the railroad. The beams span approximately perpendicular to the BNSF tracks and are placed immediately adjacent to one another; typically this gives a spacing of 4 feet on centers. The deck slab is 6 inches in thickness and is intended to act compositely with the beams. The superstructure has been divided into eight individual thermal units of approximately 150- to 180-foot length to reduce the thermal displacement and force effects. Movement between adjacent thermal units of the slab is controlled by dowelled connections, which allow relative longitudinal and vertical displacements but not relative transverse displacement. A similar dowelled connection is provided between the end panel of the slab and the adjacent span of the standard viaduct.

The standard spans of the viaduct are formed from precast, prestressed box girders and seated on reinforced concrete columns, which are in turn supported on a pile cap with a group of 4 no. 6-foot-6-inch-diameter cast-in-drilled-hole (CIDH) piles. Due to clearance constraints near to the BNSF right-of-way and reduced loading, the columns immediately adjacent to the crossover structure modify the general foundation arrangement by using a two-pile group with a narrower pile cap.

An additional row of columns was added to stiffen the Wasco Crossover Structure in the same way that was derived for the design of the Conejo Crossover Structure (PE4P CP4 Drawings). Analysis of the Conejo Crossover Structure was originally conceived as a 950-foot-long elevated slab, supported on multiple columns to either side of the BNSF railroad corridor. The 6-foot-diameter crossover columns are positioned at 30-foot centers along the length of the structure and are founded on a single 9-foot-diameter drilled shaft pile. The length of crossover structure was increased after the global model analysis was complete. To confirm that the concept of the structure at the new length was still valid, a submodel consisting of the end panel of the extended structure was analyzed to confirm that frequencies and seismic performance were similar to the original model. This analysis showed that remaining within the lower frequency boundary is necessary to stiffen the span of the structure by adding a second line of columns on the BNSF right-of-way boundary. This modification of the structure to increase the end stiffness

confirms that the original analysis model can be regarded as conservative. Therefore, the results from the original model can be used for the 1,325-foot-long Wasco Crossover Structure.

The crossover girders are proposed to be precast, prestressed bulb-tee girders. The beams are proposed to be cast with edge beams to have continuous connection. At the beginning and end of the crossover structures, a second row of columns and beams has been added to limit the span length to cross the BNSF right-of-way. In this case, the added intermediate beam next to BNSF can be cast continuous with the precast girders and the adjacent outer beam can be designed with bearing supports. Intermediate support with moment connection has been analyzed in the design. Frequency check is analyzed with 115-foot continuous span. The alternative, with an intermediate beam with bearing support, may be analyzed in the final design.

2.2 Structure Importance Classification

TM 2.3.2 paragraph 2.2.1 defines all structures supporting the high-speed tracks as primary structures because they will be required to be reinstated to allow resumption of train service after an earthquake.

This classification implies the following:

- Design life is 100 years.
- Seismic design must comply with TM 2.10.4.
- When applying the AASHTO LRFD code, values for the importance (hI), ductility (hD), and redundancy (hR) factors have been chosen as follows:
  - Importance factor hI = 1.05.
  - Ductility factor hD = 1.05 for strength calculations.
  - Redundancy factor hR = 1.05 for non-redundant elements, 1.0 otherwise.

2.3 Key Design Features and Site Constraints

2.3.1 Dowel Connections

Dowel connections are located at the breaks between adjacent thermal units of the deck slab and at the interface connections between the crossover structure and the standard viaduct sections. The purpose of the dowels is to control the relative movement between the thermal units and, in particular, the movement at the rails. The dowels are aligned to be parallel with the rail axes at the interface between the units to ensure that the relative structure movement is also along the rail axis. This ensures that lateral distortions are minimized. The dowels are assumed to allow relative rotation about the transverse axis and displacement in the longitudinal and vertical directions, but they limit all other degrees of freedom.

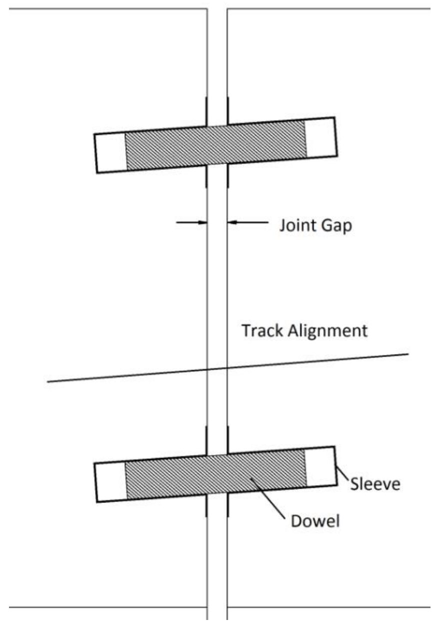

Figure 2.3-1
Detail of Dowels in One-Column Cap Beam

As the dowels are aligned with the rails, expansion joints between the adjacent thermal units are not required to be perpendicular to the rail and are not in this case. It has instead been assumed that the joints will be aligned parallel to the cross beams. This requires the joint design to consider a minor component of lateral displacement with longitudinal displacement, but this is considered to be within the capability of typically available structure joints. Alternatively, for the simplification of track clip arrangement, the joint could be made to be perpendicular to the rail in the vicinity of the HSR tracks and revert to being parallel to the beams outside this area.

The merits of these variations should be investigated further during the design development stage.

2.3.2 Drainage Concept

The track drainage for the Wasco Standard Viaduct will be carried from deck level to permanent drainpipes fitted within the void of the concrete deck girders. The drainpipes will be connected to downpipes cast into the columns. The downpipes will discharge to a detention basin, convey flows to a nearby stormwater collection system, or deliver the water into swales underneath the viaduct that would serve as detention basins and, within rural floodplains, allow the water to soak away.

For the Wasco Crossover Structure, provision will be made for collecting water at track level. The water will be conveyed to the ends of each thermal unit of the deck slab via longitudinal carrier pipes that will be located within the track bed. At the ends of the thermal unit, carrier pipes will be installed towards the edge beams, through the expansion joints, and connected to the nearest available downpipes. The downpipes will discharge to a detention basin, convey flows to a nearby stormwater collection system, or deliver the water into swales underneath the viaduct that would serve as detention basins and, within rural floodplains, allow the water to soak away.

2.3.3 Ground conditions

Geotechnical advice is based on historic borehole records from Caltrans projects located in the vicinity of the route, as no project specific or local borehole data was available. The foundation spring stiffness has therefore been based upon the lower-bound interpretation of the soil parameters, using the nearest borehole data and engineering judgment. Detailed design will be based on investigation results which are expected to demonstrate that this approach is conservative.

See the Geotechnical Report in Appendix A for details of parameters and spring stiffness used in the analysis.

2.3.4 BNSF Future Provision

Double tracking is planned by the BNSF for several locations between Port Chicago and Bakersfield. It is understood that the BNSF have no plans to install additional tracks in locations where double tracking is already provided. The Shafter Viaduct spans over two existing BNSF tracks and so no provision for future tracks has been considered necessary. The geometry of the Wasco Crossover Structure has therefore been established on the basis of two BNSF tracks only.

2.4 Summary of Analysis

The reinforced concrete box girder spans are classified as standard structures and do not fall within the scope of this preliminary design. They have been modeled where necessary in accordance with the Seismic Design Criteria, to ensure that the behavior of the crossing structure is fully representative.

All sections have been checked for resonance effects, rail serviceability and track-structure interaction limits, and force demands. The design of the Wasco Crossover Structure, including substructure, superstructure sections, and maximum span, are analogous to the Conejo Crossover Structure as seen in Appendix B. In all cases the structure has been found to be satisfactory. Although the overall lengths of the crossover structures differ, the maximum length of each thermal unit does not exceed that of the Conejo Crossover Structure. Therefore, it is assumed that the Conejo Crossover Structure is an adequate representative of the crossover design used for the Wasco Crossover Structure.

Based upon the calculations, it appears that the preliminary designs are in full compliance with the TMs and are capable of being developed into a fully compliant design solution. For the complete analysis and results justifying the design of the Wasco Crossover Structure, see the Conejo Crossover Structure Calculations Report which has been attached in Appendix C.

2.4.1 Vertical Frequency Check

A third row of columns has been added to keep the transverse span length less than 115 feet, which satisfies the lower bound frequency limit per TM 2.10.10. The vertical frequency for this span length, as originally analyzed for the Conejo Crossover Structure with two rows of columns (as seen in Appendix C), is marginal. Therefore, there is concern about reduction in vertical stiffness due to group reduction factor for the close spacing between the existing and additional row of columns. The reduced vertical stiffness in pile support may result in further reduction of vertical frequency and could be problematic in final design. From a soil-structure interaction perspective, the stiffness of a two-pile group will possess an equivalent axial stiffness that ranges between that of one to two individual piles. A structure model containing at least one thermal unit has been created based on the Wasco Crossover Structure geometry assuming a 50% reduction of single pile axial stiffness for each of the two rows of piles that are spaced less than three diameters center to center. See Figure 2.4-1

for an image of this model. Reduction in pile lateral stiffness has also been studied to demonstrate that the effect does not govern the design.

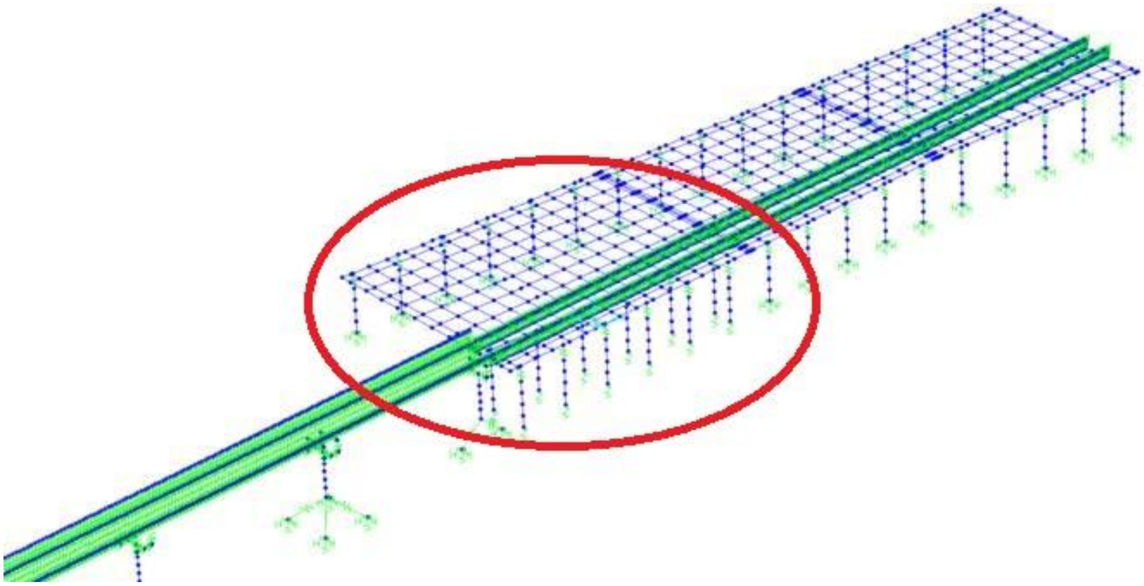

Figure 2.4-1
Vertical Frequency Check Model

As shown in Table 2.4-2, the results indicate that all analyzed cases satisfy the lower bound vertical frequency limit. There is no significant difference in vertical frequency between "Fixed 2 col," supported by calculations in Appendix C, and "0.5U1U2U3 Roller," analyzed with conservative assumptions. (Note that the vertical frequency tabulated 3.63Hz for the Conejo Crossover Structure other than 3.74 Hz for the Wasco Crossover Structure "Fixed 2 col". The difference is due to different modeling. While the Wasco Crossover Structure models a cantilevered superstructure at the missing third column, the Conejo Crossover Structure model only includes a 115-foot main span frame without cantilever. The Wasco Crossover Structure model reflects a more accurate geometry for comparison to the three rows of columns case.) With the results, it is convincing that adding a third row of columns that are closely spaced to the existing row of columns will have a minimum impact on structure vertical frequency.

Model definitions are as follows:

- "FIXED 2 col" is a model with two rows of columns modeled with full vertical and lateral foundation stiffness assigned to the base of both rows of columns.
- "FIXED 3 col" is a model with three rows of columns modeled with integral connection at the top of the exterior columns. Full vertical and lateral foundation stiffness is assigned to the base of both rows of columns.
- "ROLLER" is a model with three rows of columns modeled with a roller connection (fixed vertically and rotationally, but free to move laterally) at the top of the exterior row of columns. Full vertical and lateral foundation stiffness is assigned to the base of both rows of columns.

- "0.5U1 ROLLER" is a model with three rows of columns modeled with a roller connection (fixed vertically and rotationally, but free to move laterally) at the top of the exterior row of columns. Half of the vertical and full lateral foundation stiffness is assigned to the base of both rows of columns.

- "0.5U1, 2, 3 ROLLER" is a model with three rows of columns modeled with a roller connection (fixed in vertical and rotationally, but free to move laterally) at the top of the exterior row of columns. Half vertical and half lateral foundation stiffness is assigned to the base of both rows of columns.

Table 2.4-1
Vertical Frequency Limit Calculation

Description	Value	Units
Transverse span (centerline to centerline)	115.2	ft
Column length	35.5	ft
Effective span, length	80.7	ft
Lower bound	3.54	Hz
Upper bound	8.64	Hz

Table 2.4-2
Frequency analysis result

Model Name	Top Fixity	Foundation Spring		Vertical Frequency	
SAP Model Name	3rd Row of Columns	Vertical Factor	Lateral Factor	Mode	Hz
Fixed 2 col	**-**	**1.0**	**1.0**	**36**	**3.74**
Fixed 3 col	Fixed	1.0	1.0	40	4.05
Roller	Roller	1.0	1.0	40	4.00
0.5U1 Roller	Roller	0.5	1.0	35	3.69
0.5U1U2U3 Roller	Roller	0.5	0.5	34	3.66

2.5 Limits of Standard Bridge Design and Special Bridge Design

The boundary spans adjacent to the crossover structure have the standard span length and cross section, and are considered as standard structures. Therefore, the standard bridge design is suitable for use on spans from abutment 1 to bent 84 and from bent 85 to abutment 92. The crossover structure itself occupies the section of viaduct between bent 84 and bent 85 and is the subject of the analysis comparable to the Conejo Crossover Structure.

2.6 Construction Methods Assessment

The assumed method and sequence of construction for the crossover structure is to construct the CIDH shafts alongside the BNSF right-of-way line. These piles will be extended as columns in a second stage concrete pour. Subsequently it is assumed that the lower part of the column cap beam will be formed and cast on falsework to provide a temporary seat onto which the precast beams can be placed.

Each beam will have a lift weight of approximately 60 to 70 tons and the erection lift radius is likely to be approximately 100 to 130 feet.

It is assumed that beams will be lifted from the east side of the structure straight from the delivery truck using a mobile crane. It is expected that as beam placement is a relatively quick operation, this can be done between trains running on the BNSF, though the BNSF should be consulted to confirm the acceptability of this approach. Some beams adjacent to expansion joints may require additional concrete for the joints to be cast onto them as a second stage pour prior to erection.

Once a section of beams between expansion joints is placed, the deck slab in that area can be cast to produce the final slab structure. Stay-in-place forms will be required between beams per BNSF guidelines. The deck pour is also assumed to include the upper half of the column capping beam which allows the beams and deck to act monolithically with the column cap and columns.

The constraints specific to the crossover structure suggest that a particular method of erection is most likely to be used by contractors. This does not rule out other methods of construction. It is likely that contractors will prefer to use methods that they have used successfully in the past. The assessment described here represents a subset of methods that could be used.

2.7 Temporary Construction Loadings Considered

No specific loadings have been considered for the temporary stages described.

2.8 Temporary Construction Easements

A general temporary construction easement of 100-foot width has been identified on one side of the crossover structure with a 10-foot width on the other side. These TCEs extend for the full length of the crossover structure. The side of the structure that has the 100-foot width was chosen as the side that appears to have the easiest connection to the local roadway network. It is expected that a 100-foot TCE will be sufficient to accommodate the access and crane requirements for beam placement.

2.9 Traffic or Pedestrian Diversion and Control

The construction of the standard viaduct is expected to be supplied from along the route. At the crossover structure there is access to the local roadway system via Santa Fe Way and it is expected that these routes will be the primary means for supplying beams and construction materials to the worksite. As this is a rural area it is anticipated that only localized traffic control measures will be required at the site entrances at peak work times.

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Section 3.0

E Lerdo Highway Structure

3.0 E Lerdo Highway Crossing

The Shafter Viaduct is 16,195 feet in length and composed of three sections: the northern standard viaduct, the BNSF crossing, and the southern standard viaduct (RS 15% Drawings). The Shafter Crossover Structure, which crosses the HSR over the BNSF, is discussed in Chapter 6.0 of this report. Both the northern and southern standard viaducts have instances where a span larger than the 120-foot standard span is required to cross local facilities. At these locations, a three- or four-span segment of a continuous concrete box girder is implemented to reach larger spans. The northern standard viaduct has three instances of a multispan continuous concrete box girder spanning E Lerdo Highway, BNSF Spur, S Beech Avenue, and E Los Angeles Avenue. E Lerdo Highway Crossing is a part of the southern standard viaduct of the Shafter Viaduct where both Orange Avenue and the proposed Lone Star Spur realignment are crossed through continuous concrete box girder spans.

The E Lerdo Highway Crossing in this section is the first set of continuous concrete box girder spans of the Shafter Viaduct. It is a four-span structure that starts at Sta 5994+70.00.

3.1 Structure Form

The span crosses over E Lerdo Highway and BNSF Spur by a four-span continuous concrete box girder structure. Bent 36 is located at the median of E Lerdo Highway to cut the span length down to 160 feet south of E Lerdo Highway (RS 15% Drawings). The span that crosses over BNSF Spur is 190 feet. The continuous spans are respectively 120 feet, 160 feet, 190 feet, and 115 feet with a vertical clearance of 24 feet and 6 inches at E Lerdo Highway, and 28 feet 11 inches at BNSF Spur. The larger span is a result of skew at the crossing. The foundations are rotated 45 degrees in order to minimize the span length. An adjacent span is sized at 115 feet, which has a ratio of 0.6 to the main span.

The structure depth is similar to the shape of the bending moment diagram where the structure depth increases at the integral bent connections as seen in Figure 3.1-1. The middle spans have curved soffit with maximum depth of 15 feet 0 inches at the ends and 12 feet 0 inches at the center at E Lerdo Highway, and 19 feet 0 inches at the ends and 12 feet 0 inches at the center at BNSF Spur. The adjacent cantilever spans taper to 10 feet 6 inches deep. The aerial spans are formed using 10-foot 6-inch deep precast, prestressed reinforced concrete box girders that range in length from 100 feet to 120 feet. The PE4P width of concrete superstructure is 43 feet 0 inches.

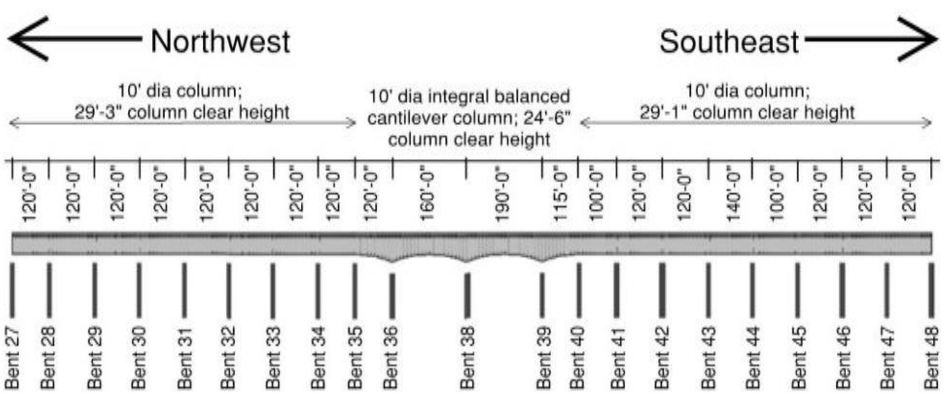

Figure 3.1-1
E Lerdo Highway Crossing Column and Span Geometry

Each end of the continuous construction segment (bents 35 and 40) is articulated by a roller bearing which allows for displacement in the longitudinal direction due to expansion in the structure. This complies with the maximum limit from the fixed point to the free point of structure (i.e., structural thermal unit) of 330 feet presented in TM 2.10.10. Therefore, no rail expansion joints are required.

The standard spans of the viaduct are formed from precast, prestressed box girders and seated on reinforced concrete columns, which are in turn supported on a pile cap with a group of 4no. 6-foot-6-inch diameter CIDH piles. Similarly, the integral bent columns are supported on a pile cap with a group of 4no. 6-foot-6-inch diameter drilled shaft piles. These foundations are rotated 45 degrees in plan as mentioned previously.

Balanced cantilever construction method or cast-in-place construction with formwork can be used to erect the continuous concrete box girder superstructure.

3.2 Structure Importance Classification

TM 2.3.2 paragraph 2.2.1 defines all structures supporting the high-speed tracks to be primary structures because they will be required to be reinstated to allow resumption of train service after an earthquake.

This classification implies the following:

- Design life is 100 years.
- Seismic design must comply with TM 2.10.4.
- When applying the AASHTO LRFD code, values for the importance, ductility, and redundancy factors, hI, hD, and hR have been chosen as follows:
  - Importance factor hI = 1.05.
  - Ductility factor hD = 1.05 for strength calculations.
  - Redundancy factor h_R = 1.05 for nonredundant elements, 1.0 otherwise.

3.3 Key Design Features and Site Constraints

3.3.1 E Lerdo Highway and BNSF Spur

Both the E Lerdo Highway and BNSF Spur pass under HSR structure on a skew and, therefore, result in a longer span at the crossing. HSR structure is required to maintain 24-foot-0-inch vertical clearance across the proposed BNSF Spur.

3.3.2 Drainage Concept

The track drainage for the Shafter Standard Viaduct and E Lerdo Highway Crossing will be carried from deck level to permanent drainpipes fitted within the void of the concrete deck girders. The drainpipes will be connected to downpipes cast into the columns. The downpipes will discharge to a detention basin, convey flows to a nearby stormwater collection system, or deliver the water into swales underneath the viaduct that would serve as detention basins and, within rural floodplains, allow the water to soak away.

3.3.3 Ground Conditions

Geotechnical advice is based on historic borehole records from Caltrans projects located in the vicinity of the route, as no local borehole data were available. The foundation spring stiffness has therefore been based upon the lower-bound interpretation of the soil parameters, using the nearest borehole data and engineering judgment. Detailed design will be based on investigation results which are expected to demonstrate that this approach is conservative.

See the Geotechnical Design Report in Appendix A for details.

3.4 Analysis Methodology

The reinforced concrete box girder spans are classified as standard structures and do not fall within the scope of this preliminary design. They have been modeled where necessary in accordance with the Seismic Design Criteria, to ensure that the behavior of the crossing structure is fully representative.

The complex continuous concrete girder sections, at E Lerdo Highway Crossing, are not explicitly checked for resonance effects, rail serviceability and track-structure interaction limits, and force demands. This is because the analysis of nonstandard and complex structures took place at a time when the preferred route option, or LEDPA, had not yet been selected and the continuous concrete girder spans along WS1 were not selected for analysis. Nevertheless, the compliance with the span to depth ratio and structural thermal unit limit provided in the TMs imply that long-span continuous concrete girder structures, such as E Lerdo Highway Crossing, are capable of being developed into a fully compliant design solution.

The depth to span ratio of the continuous concrete girder structure could be optimized by performing additional analysis. A prestressing model can be used to study vertical load cases. Vertical frequency should also be checked while optimizing the depth for longer span structures. For lateral analysis, a finite element model of the continuous concrete girder spans plus additional adjacent boundary spans could be used to capture track-structure interaction behavior. Further discussion of analysis/design can be found in Section 1.0.

3.5 Limits of Standard Bridge Design and Special Bridge Design

The boundary spans adjacent to E Lerdo Highway Crossing have the standard span length and cross section, and are considered as standard structures. Therefore, the standard bridge design is suitable for use on spans from abutment 1 to bent 35, bent 40 to bent 42, bent 45 to bent 65, bent 68 to 70, bent 71 to bent 109, and from bent 113 to abutment 121. E Lerdo Highway Crossing itself occupies the section of viaduct between bent 35 and bent 40 and is the subject of this section.

3.6 Construction Methods Assessment

Bents 38 and 39 of the E Lerdo Highway Crossing are located at a Y intersection with access to the local road network via Mannel Avenue and E Lerdo Highway. The structure is proposed to be post tensioned continuous concrete box girder with integral bents. Both cast-in-place construction and precast balanced cantilever construction can be used at contractor’s choice.

3.6.1 Cast-in-place Construction

Concrete box girders are typically constructed by cast-in-place methods in California. The traditional cast-in-place construction requires temporary shoring and falsework, as well as additional clearance provisions to take into account the space occupied by falsework. At E Lerdo Highway, vertical clearance is 24'-7", which is plenty to accommodate falsework to span over E Lerdo Highway. For the span crossing BNSF Spur, it is possible that the superstructure could be constructed in situ with suitable agreement for temporary operation from BNSF.

3.6.2 Precast Balanced Cantilever Construction

Balanced cantilever construction is usually selected when access of falsework construction is limited or vertical clearance is not enough for the roadway below. Also, cast-in-place construction is typically slow, requiring large labor efforts for the falsework, shoring placement, and removal. Precast balanced cantilever construction is another viable construction scheme for spanning over E Lerdo Highway and BNSF spur. Superstructure can be cast in segments off site and erected in place symmetrically at Bent 36, Bent 38, and Bent 39.

None of these erection methods excludes other methods of construction from consideration. It is likely that contractors will prefer to use methods that they have used successfully in the past. The assessment described here therefore represents a subset of methods that could be used.

3.7 Temporary Construction Loadings Considered

No specific loadings have been considered for the temporary stages described.

3.8 Temporary Construction Easements

A general temporary construction easement of 15-foot width outside of the permanent right-of-way has been indicated at E Lerdo Highway Crossing. At the structure location this gives a total corridor width of 80 feet, which is considered sufficient for the foreseeable requirements for construction of such a structure.

3.9 Traffic or Pedestrian Diversion and Control

Work over and adjacent to E Lerdo Highway and BNSF will be subject to the agreement of Local agency and BNSF and is likely to include restrictions on working over the live roadway and requirements for lane closure and traffic diversion during key stages of the construction.

Section 4.0

BNSF Spur Crossing

4.0 BNSF Spur Crossing

The Shafter Viaduct is 16,195 feet long and composed of three sections: the northern standard viaduct, the BNSF crossing, and the southern standard viaduct (RS 15% Drawings). The Shafter Crossover Structure, which crosses the HSR over the BNSF, is discussed in Chapter 6.0 of this report. Both the northern and southern standard viaducts have instances where a span larger than the 120-foot standard span is required to cross local facilities. At these locations, a three- or four-span segment of continuous concrete box girder sections is implemented to reach larger spans.

The northern standard viaduct has three instances of multispan continuous concrete box girder spanning E Lerdo Highway, BNSF Spur, S Beech Avenue, and E Los Angeles Avenue. The BNSF Spur Crossing is a part of the southern standard viaduct of the Shafter Viaduct where two BNSF spur tracks and assumed right-of-way are crossed through continuous concrete box girder spans.

The BNSF Spur Crossing in this section is the second set of continuous concrete box girder spans of the Shafter Viaduct. It is a three-span structure that starts at Sta 6002+75.00.

4.1 Structure Form

The HSR crosses over the BNSF Spur at a 30-degree skew with a span of 140 feet. The spur right-of-way is unclear but assumed to be greater than 25 feet, and the foundations are rotated 45 degrees in order to minimize the span length. The span is achieved through a three-span continuous concrete box girder with integral bents. The continuous spans are respectively 120 feet, 140 feet, and 100 feet with a vertical clearance of 29 feet and 1 inch over the BNSF Spur.

The structure depth is constant in the three-span continuous concrete girder set. The structure depth shown on 15% RS Drawings is 12 feet 0 inches, which could be optimized to 10 feet 6 inches deep to match standard span depth in the final design. The aerial spans are formed using 10-foot 6-inch deep precast, prestressed reinforced concrete box girders that range in length from 100 feet to 120 feet. The PE4P width of concrete superstructure is 43 feet 0 inches.

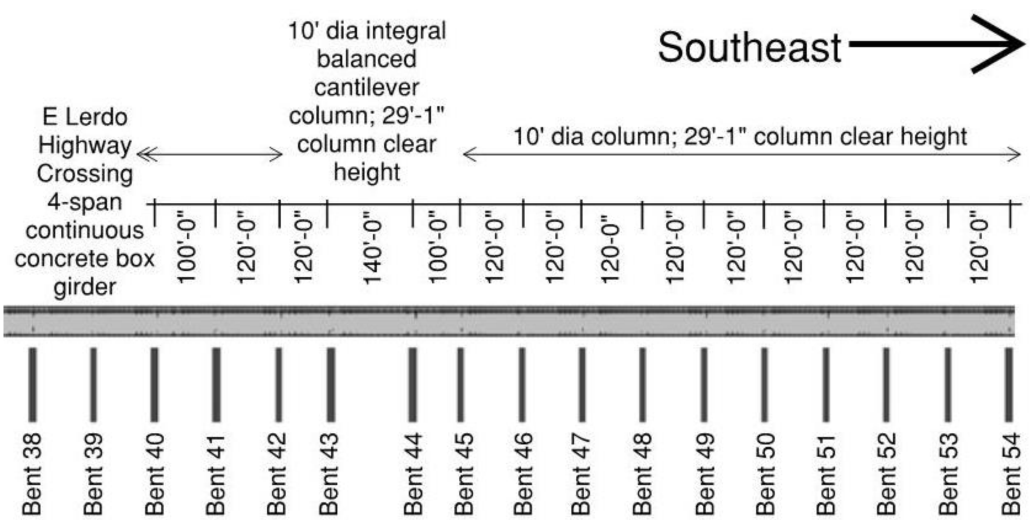

Figure 4.1-1
BNSF Spur Crossing Column and Span Geometry

Each end of the continuous construction segment (bents 42 and 45) is articulated by a roller bearing which allows for displacement in the longitudinal direction due to expansion in the structure. This complies with the maximum limit from the fixed point to the free point of structure (i.e., structural thermal unit) of 330 feet presented in TM 2.10.10. Therefore, no rail expansion joints are required.

The standard spans of the viaduct are formed from precast, prestressed box girders and seated on reinforced concrete columns, which are in turn supported on a pile cap with a group of 4no. 6-foot-6-inch diameter CIDH piles. Similarly, the integral bent columns are supported on a pile cap with a group of 4no. 6-foot-6-inch diameter drilled shaft piles. These foundations are rotated 45 degrees in plain view as mentioned previously.

4.2 Structure Importance Classification

TM 2.3.2 paragraph 2.2.1 defines all structures supporting the high-speed tracks as primary structures because they will be required to be reinstated to allow resumption of train service after an earthquake.

This classification implies the following:

- Design life is 100 years.
- Seismic design must comply with TM 2.10.4.
- When applying the AASHTO LRFD code, values for the importance, ductility, and redundancy factors, hI, hD, and hR have been chosen as follows:
  - Importance factor hI = 1.05.
  - Ductility factor hD = 1.05 for strength calculations.
  - Redundancy factor hR = 1.05 for nonredundant elements, 1.0 otherwise.

4.3 Key Design Features and Site Constraints

4.3.1 BNSF Spur

The BNSF Spur passes under HSR structure on a skew and therefore results in a longer span at the crossing. HSR structure is required to maintain 24-foot-0-inch vertical clearance across the BNSF Spur.

4.3.2 Drainage Concept

The track drainage for the Shafter Standard Viaduct and BNSF Spur Crossing will be carried from deck level to permanent drainpipes fitted within the void of the concrete deck girders. The drainpipes will be connected to downpipes cast into the columns. The downpipes will discharge to a detention basin, convey flows to a nearby stormwater collection system, or deliver the water into swales underneath the viaduct that would serve as detention basins and, within rural floodplains, allow the water to soak away.

4.3.3 Ground Conditions

Geotechnical advice is based on historic borehole records from Caltrans projects located in the vicinity of the route, as no local borehole data were available. The foundation spring stiffness has therefore been based upon the lower-bound interpretation of the soil parameters, using the nearest borehole data and engineering judgment. Detailed design will be based on investigation results which are expected to demonstrate that this approach is conservative.

See the Geotechnical Design Report in Appendix A for details.

4.4 Analysis Methodology

The reinforced concrete box girder spans are classified as standard structures and do not fall within the scope of this preliminary design. They have been modeled where necessary in accordance with the Seismic Design Criteria, to ensure that the behavior of the crossing structure is fully representative.

The complex continuous concrete girder sections, at BNSF Spur Crossing, are not explicitly checked for resonance effects, rail serviceability and track-structure interaction limits, and force demands. This is because the analysis of nonstandard and complex structures took place at a time when the preferred route option, or LEDPA, had not yet been selected and the continuous concrete girder spans along WS1 were not selected for analysis. Nevertheless, the compliance with the span to depth ratio and structural thermal unit limit provided in the TMs imply that long span continuous concrete girder structures, such as BNSF Spur Crossing are capable of being developed into a fully compliant design solution.

The depth to span ratio of the continuous concrete girder structure could be optimized by performing additional analysis. A prestressing model can be used to study vertical load cases. Vertical frequency should also be checked while optimizing the depth for longer span structures. For lateral analysis, a finite element model of the continuous concrete girder spans plus additional adjacent boundary spans could be used to capture track-structure interaction behavior. Further discussion of analysis/design can be found in Section 1.0.

4.5 Limits of Standard Bridge Design and Special Bridge Design

The boundary spans adjacent to BNSF Spur Crossing have the standard span length and cross section, and are considered as standard structures. Therefore, the standard bridge design is suitable for use on spans from abutment 1 to bent 35, bent 40 to bent 42, bent 45 to bent 65, bent 68 to 70, bent 71 to bent 109, and from bent 113 to abutment 121. BNSF Spur Crossing itself occupies the section of viaduct between bent 42 and bent 45 and is the subject of this section.

4.6 Construction Methods Assessment

The BNSF Spur Crossing consists of continuous concrete box girder from bent 42 to bent 45. The longest span at BNSF Spur Crossing is 140 feet. Superstructure depth is proposed to be the same as adjacent standard viaduct superstructure, and stays constant instead of hunched. Both cast-in-place construction and precast construction can be used at contractor's choice.

4.6.1 Cast-in-place Construction

Concrete box girders are typically constructed by cast-in-place methods in California. The traditional cast-in-place construction requires temporary shoring and falsework, as well as additional clearance provisions to take into account space occupied by falsework. At BNSF Spur, vertical clearance is 29 feet 1 inch, which is plenty to accommodate falsework. It is possible that the superstructure could be constructed in situ with suitable agreement for temporary operation from BNSF.

4.6.2 Precast Construction

Depending on the construction method used for the adjacent viaduct, it is likely more cost effective to carry on the same construction method for the BNSF spur. In the case that full span segmental construction is used for standard viaduct, i.e., self-launching overhead gantry system, bent cap can be cast in-place to make the segmented span continuous. Balanced cantilever construction may also be used as a viable alternative while it could be economical if adjacent continuous spans have selected such a method.

None of these erection methods exclude other methods of construction from consideration. It is likely that contractors will prefer to use methods that they have used successfully in the past. The assessment described here therefore represents a subset of methods that could be used.

4.7 Temporary Construction Loadings Considered

No specific loadings have been considered for the temporary stages described.

4.8 Temporary Construction Easements

A general temporary construction easement of 15-foot width outside of the permanent right-of-way has been indicated at BNSF Spur Crossing. At the structure location this gives a total corridor width of 80 feet which is considered sufficient for the foreseeable requirements for construction of such a structure.

4.9 Traffic or Pedestrian Diversion and Control

Work over and adjacent BNSF Spur will be subject to the agreement of BNSF and is likely to include restrictions on working over the live roadway and requirements for lane closure and traffic diversion during key stages of the construction.

Section 5.0

S Beech Avenue Crossing

5.0 S Beech Avenue Crossing

The Shafter Viaduct is 16,195 feet in length and composed of three sections: the northern standard viaduct, the BNSF crossover, and the southern standard viaduct (RS 15% Drawings). The Shafter Crossover Structure, which crosses the HSR over the BNSF, is discussed in Chapter 6.0 of this report. Both the northern and southern standard viaducts have instances where a span larger than the 120-foot standard span is required to cross local facilities. At these locations, a three- or four-span segment of continuous concrete box girder is implemented to reach larger spans. The northern standard viaduct has three instances of multispan balanced cantilever continuous construction spanning E Lerdo Highway, BNSF Railways, S Beech Avenue, and E Los Angeles Avenue. S Beech Avenue Crossing is a part of the southern standard viaduct of the Shafter Viaduct where both S Beech Avenue and E Los Angeles Avenue are simultaneously crossed through continuous concrete box girder spans.

The S Beech Avenue Crossing in this section is the third set of continuous concrete box girder spans of the Shafter Viaduct right before the BNSF Crossover Structure. It is a three-span structure that starts at Sta 6030+35.00.

5.1 Structure Form

The span crossing over the S Beech Avenue and E Los Angeles Avenue is 150 feet spanning the "Y" shaped intersection. The span is achieved through a three-span continuous concrete box girder with integral bents. The continuous spans are respectively 120 feet, 150 feet, and 120 feet with a vertical clearance of 25 feet and 3 inches, crossing over the S Beech Avenue and E Los Angeles Avenue intersection (PE4P CP4 Drawings). The foundations are rotated 45 degrees in order to minimize the span length.

The structure depth is similar to the shape of the bending moment diagram where the structure depth increases at the integral bent connections as seen in Figure 5.1-1. The middle span of the balanced cantilever has a curved soffit with a maximum depth of 15 feet 0 inches at the ends and 12 feet 0 inches at the center. The adjacent cantilever spans taper from 15 feet 0 inches deep to 10 feet 6 inches deep. The aerial spans are formed using 10-foot-6-inch-deep precast, prestressed reinforced concrete box girders that range in length from 100 feet to 120 feet. The PE4P width of concrete superstructure is 43 feet 0 inches.

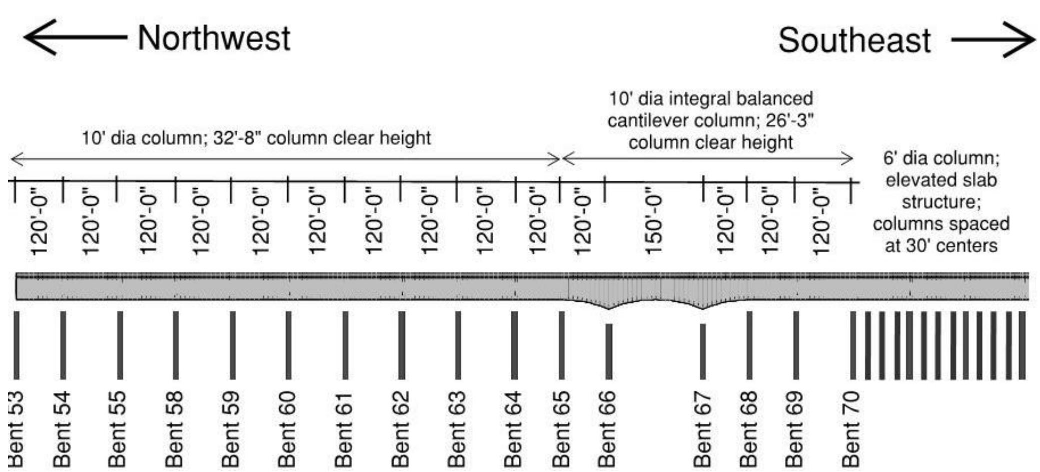

Figure 5.1-1
S Beech Avenue Crossing Column and Span Geometry

Each end of the continuous construction segment (bents 65 and 68) is articulated by a roller bearing which allows for displacement in the longitudinal direction due to expansion in the structure. This complies with the maximum limit from the fixed point to the free point of structure (i.e., structural thermal unit) of 330 feet presented in TM 2.10.10. Therefore, no rail expansion joints are required.

The standard spans of the viaduct are formed from precast, prestressed box girders and seated on reinforced concrete columns, which are in turn supported on a pile cap with a group of 4no. 6-foot-6-inch diameter CIDH piles. Similarly, the integral bent columns are supported on a pile cap with a group of 4no. 6-foot-6-inch diameter drilled shaft piles. These foundations are rotated 45 degrees in plan as mentioned previously.

Balanced cantilever construction method or cast-in-place construction with formwork can be used to erect the continuous concrete box girder superstructure.

5.2 Structure Importance Classification

TM 2.3.2 paragraph 2.2.1 defines all structures supporting the high-speed tracks as primary structures because they will be required to be reinstated to allow resumption of train service after an earthquake.

This classification implies the following:

- Design life is 100 years.
- Seismic design must comply with TM 2.10.4.
- When applying the AASHTO LRFD code, values for the importance, ductility, and redundancy factors, hI, hD, and hR have been chosen as follows:
  - Importance factor hI = 1.05.
  - Ductility factor hD = 1.05 for strength calculations.
  - Redundancy factor hR = 1.05 for nonredundant elements, 1.0 otherwise.

5.3 Key Design Features and Site Constraints

5.3.1 S Beech Avenue/E Los Angeles Avenue

S Beech Avenue/E Los Angeles Avenue are required to maintain 16-foot-6-inch vertical clearance across the intersection. The bent columns are placed outside the roadway while placing footing within the roadway to minimize the span.

5.3.2 Drainage Concept

The track drainage for the Shafter Standard Viaduct and S Beech Avenue Crossing will be carried from deck level to permanent drainpipes fitted within the void of the concrete deck girders. The drainpipes will be connected to downpipes cast into the columns. The downpipes will discharge to a detention basin, convey flows to a nearby stormwater collection system, or deliver the water into swales underneath the viaduct that would serve as detention basins and, within rural floodplains, allow the water to soak away.

5.3.3 Ground Conditions

Geotechnical advice is based on historic borehole records from Caltrans projects located in the vicinity of the route, as no local borehole data were available. The foundation spring stiffness has therefore been based upon the lower-bound interpretation of the soil parameters, using the nearest borehole data and engineering judgment. Detailed design will be based on investigation results which are expected to demonstrate that this approach is conservative.

See the Geotechnical Design Report in Appendix A for details.

5.4 Analysis Methodology

The reinforced concrete box girder spans are classified as standard structures and do not fall within the scope of this preliminary design. They have been modeled where necessary in accordance with the Seismic Design Criteria, to ensure that the behavior of the crossing structure is fully representative.

The complex continuous concrete girder sections at S Beech Avenue are not explicitly checked for resonance effects, rail serviceability and track-structure interaction limits, and force demands. This is because the analysis of nonstandard and complex structures took place at a time when the preferred route option, or LEDPA, had not yet been selected and the continuous concrete girder spans along WS1 were not selected for analysis. Nevertheless, the compliance with the span to depth ratio and structural thermal unit limit provided in the TMs imply that longer span continuous concrete girder structures, such as S Beech Avenue Crossing, are capable of being developed into a fully compliant design solution.

The depth to span ratio of continuous concrete girder could be optimized by performing additional analysis. A prestressing model can be used to study vertical load cases. Vertical frequency shall also be checked while optimizing the depth for longer span structures. For lateral analysis, finite element model of the continuous concrete girder spans plus additional adjacent boundary spans will be used to capture track-structure interaction behavior. Further discussion of analysis/design can be found in Section 1.0.

5.5 Limits of Standard Bridge Design and Special Bridge Design

The boundary spans adjacent to S Beech Avenue Crossing have the standard span length and cross section, and are considered as standard structures. Therefore, the standard bridge design is suitable for use on spans from abutment 1 to bent 35, bent 40 to bent 42, bent 45 to bent 65, bent 68 to 70, bent 71 to bent 109, and from bent 113 to abutment 121. S Beech Avenue Crossing occupies the section of viaduct between bent 65 and bent 68 and is the subject of this section.

5.6 Construction Methods Assessment

The S Beech Avenue Crossing is proposed to be post-tensioned continuous concrete box girder with integral bents. Both cast-in-place construction and precast balanced cantilever construction can be used at contractor's choice.

5.6.1 Cast-in-place Construction

Concrete box girders are typically constructed by cast-in-place methods in California. The traditional cast-in-place construction requires temporary shoring and falsework, as well as additional clearance provisions to take into account space occupied by falsework. At S Beech Avenue Crossing, vertical clearance is 25 feet 3 inches, which is plenty to accommodate falsework to span over S Beech Avenue and E Los Angeles Avenue.

5.6.2 Precast Balanced Cantilever construction

Precast balanced cantilever construction is usually selected when access of falsework construction is limited or vertical clearance is not enough for the roadway below. Also, cast-in-place construction is typically slow, requiring large labor efforts for the falsework, shoring placement, and removal. Precast balanced cantilever construction is another viable construction scheme for spanning over S Beech Avenue and E Los Angeles Avenue. Superstructure can be cast in segments off site and erected in place symmetrically at Bent 66 and Bent 67.

With further analyses, given the marginal span length, there is also the possibility that the superstructure depth can remain consistent with the standard viaduct. In the case that full-span segmental construction is used for the Standard Viaduct, i.e., a self-launching overhead gantry system, bent cap can be cast in-place to make the segmented span continuous.

None of these erection methods exclude other methods of construction from consideration. It is likely that contractors will prefer to use methods that they have used successfully in the past. The assessment described here therefore represents a subset of methods that could be used.

5.7 Temporary Construction Loadings Considered

No specific loadings have been considered for the temporary stages described.

5.8 Temporary Construction Easements

A general temporary construction easement of 15-foot width outside of the permanent right-of-way has been indicated at S Beech Avenue Crossing. At the structure location this gives a total corridor width of 80 feet which is considered sufficient for the foreseeable requirements for construction of such a structure.

5.9 Traffic or Pedestrian Diversion and Control

Work over and adjacent to S Beech Avenue and E Los Angeles Avenue will be subject to the agreement of the City of Shafter and is likely to include restrictions on working over the live roadway and requirements for lane closure and traffic diversion during key stages of the construction.

Section 6.0

Shafter Crossover Structure

6.0 Shafter Crossover Structure

The Shafter Viaduct is 16,195 feet in length and composed of three sections: the northern standard viaduct, the BNSF crossover, and the southern standard viaduct (RS 15% Drawings). Both the northern and southern standard viaducts have instances where a span larger than the 120-foot standard span is required to cross local facilities. At these locations, a three- or four-span segment of continuous concrete box girder is implemented to reach larger spans. The northern standard viaduct has three instances of multispan balanced cantilever construction in order to cross E Lerdo Highway, BNSF Railways, S Beech Avenue, and E Los Angeles Avenue. The southern standard viaduct has one instance of multispan continuous concrete box girder in order to cross the Proposed Lone Star Spur Realignment. The BNSF Crossing Structure is complex and is the subject of this section.

Analysis of nonstandard and complex structures took place at a time when the preferred route option, or LEDPA, had not yet been selected. None of the nonstandard and complex structures designated for detailed analysis are within the CP4 alignment (See Table 1.2-1). Notwithstanding this, the behavior of the Conejo Crossover Structure is considered to be representative of similar crossover structures on the selected preferred alignment. As the Conejo Crossover Structure satisfies all of the HSR design criteria, as seen in Appendix B, the Shafter Crossover Structure, which is of similar width, can also be designed to satisfy these criteria.

6.1 Structure Form

The BNSF Crossover portion of the Shafter Viaduct is conceived as a 2,240-foot-long elevated slab, supported on multiple columns to either side of the BNSF railroad corridor. The 6-foot-diameter crossover columns are positioned at 30-foot centers along the length of the structure and are founded on a single 9-foot-diameter drilled shaft pile.

The slab section is constructed from 6-foot-deep precast PC beams and supported on 12-foot-deep by 30-foot-span in situ concrete column cap beams, which run parallel to the railroad. The beams span nearly perpendicular to the BNSF tracks and are placed immediately adjacent to one another; typically this gives a spacing of 4 feet on centers. The deck slab is 6 inches in thickness and is intended to act compositely with the beams. The superstructure has been divided into 12 individual thermal units of approximately 150- to 180-foot length to reduce the thermal displacement and force effects. Movement between adjacent thermal units of the slab is controlled by dowelled connections, which allow relative longitudinal and vertical displacements but not relative transverse displacement. A similar dowelled connection is provided between the end panel of the slab and the adjacent span of the standard viaduct.

The standard spans of the viaduct are formed from precast, prestressed box girders and seated on reinforced concrete columns, which are in turn supported on a pile cap with a group of 4 no. 6-foot-6-inch-diameter CIDH piles. Due to clearance constraints near to the BNSF right-of-way and reduced loading, the columns immediately adjacent to the crossover structure modify the general foundation arrangement by using a two-pile group with a narrower pile cap.

An additional row of columns was added to stiffen the Shafter Crossover Structure (PE4P CP4 Drawings) in the same way that was derived for the design of the Conejo Crossover Structure (Appendix B). Analysis of the Conejo Crossover Structure was originally conceived as a 950-foot-long elevated slab, supported on multiple columns to either side of the BNSF railroad corridor. The 6-foot-diameter crossover columns are positioned at 30-foot centers along the length of the structure and are founded on a single 9-foot-diameter drilled shaft pile. The length of crossover structure was increased after the global model analysis was complete. To confirm that the concept of the structure at the new length was still valid, a submodel consisting of the end panel of the extended structure was analyzed to confirm that frequencies and seismic performance

were similar to the original model. This analysis showed that remaining within the lower frequency boundary is necessary to stiffen the span of the structure by adding a second line of columns on the BNSF right-of-way boundary. This modification of the structure to increase the end stiffness confirms that the original analysis model can be regarded as conservative. Therefore, the results from the original model can be used for the 2,240-foot Shafter crossover structure.

The crossover girders are proposed to be precast prestressed bulb-tee girders. The beams are proposed to be cast with edge beams to have continuous connection. At the beginning and end of the crossover structures, a second row of columns and beams has been added to limit the span length to cross the BNSF right-of-way. In this case, the added intermediate beam can be designed with bearing supports. Intermediate support with moment connection has been analyzed in the design. Frequency check is analyzed with 115-foot continuous span. The alternative, with an intermediate beam with bearing support, may be analyzed in the final design.

6.2 Structure Importance Classification

TM 2.3.2 paragraph 2.2.1 defines all structures supporting the high-speed tracks to be primary structures because they will be required to be reinstated to allow resumption of train service after an earthquake.

This classification implies the following:

- Design life is 100 years.
- Seismic design must comply with TM 2.10.4.
- When applying the AASHTO LRFD code, values for the importance (hI), ductility (hD), and redundancy (hR) factors have been chosen as follows:
  - Importance factor hI = 1.05.
  - Ductility factor hD = 1.05 for strength calculations.
  - Redundancy factor hR = 1.05 for non-redundant elements, 1.0 otherwise.

6.3 Key Design Features and Site Constraints

6.3.1 Dowel Connections

Dowel connections are located at the breaks between adjacent thermal units of the deck slab and at the interface connections between the crossover structure and the standard viaduct sections. The purpose of the dowels is to control the relative movement between the thermal units and, in particular, the movement at the rails. The dowels are aligned to be parallel with the rail axes at the interface between the units to ensure that the relative structure movement is also along the rail axis. This ensures that lateral distortions are minimized. The dowels are assumed to allow relative rotation about the transverse axis and displacement in the longitudinal and vertical directions, but they limit all other degrees of freedom.

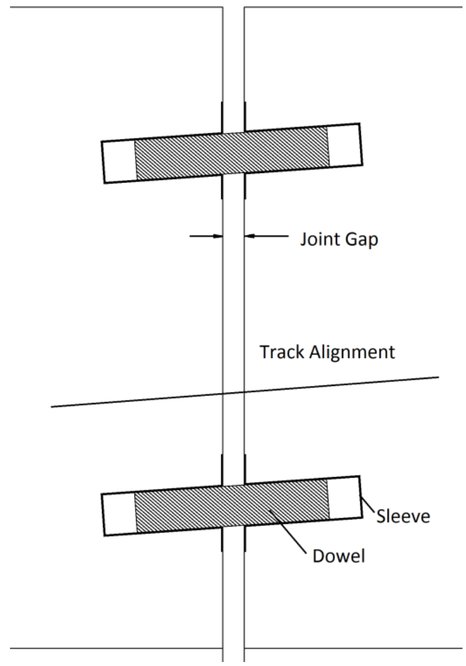

Figure 6.3-1
Detail of Dowels in One-Column Cap Beam

As the dowels are aligned with the rails, expansion joints between the adjacent thermal units are not required to be perpendicular to the rail and are not in this case. It has instead been assumed that the joints will be aligned parallel to the cross beams. This requires the joint design to consider a minor component of lateral displacement with longitudinal displacement, but this is considered to be within the capability of typically available structure joints. Alternatively, for the simplification of track clip arrangement, the joint could be made perpendicular to the rail in the vicinity of the HSR tracks and revert to being parallel to the beams outside this area.

The merits of these variations should be investigated further during the design development stage.

6.3.2 Drainage Concept

The track drainage for the Shafter Standard Viaduct will be carried from deck level to permanent drainpipes fitted within the void of the concrete deck girders. The drainpipes will be connected to downpipes cast into the columns. The downpipes will discharge to a detention basin, convey flows to a nearby stormwater collection system, or deliver the water into swales underneath the viaduct that would serve as detention basins and, within rural floodplains, allow the water to soak away.

For the Shafter Crossover Structure, provision will be made for collecting water at track level. The water will be conveyed to the ends of each thermal unit of the deck slab via a longitudinal carrier pipe that will be located within the track bed. At the ends of the thermal unit, carrier pipes will be installed towards the edge beams, through the expansion joints, and connected to the nearest available downpipes. The downpipes will discharge to a detention basin, convey flows to a nearby stormwater collection system, or deliver the water into swales underneath the viaduct that would serve as detention basins and, within rural floodplains, allow the water to soak away.

6.3.3 Ground conditions

Geotechnical advice is based on historic borehole records from Caltrans projects located in the vicinity of the route, as no project-specific or local borehole data was available. The foundation spring stiffness has therefore been based upon the lower-bound interpretation of the soil parameters, using the nearest borehole data and engineering judgment. Detailed design will be based on investigation results which are expected to demonstrate that this approach is conservative.

See the Geotechnical Report in Appendix A for details of parameters and spring stiffness used in the analysis.

6.3.4 BNSF Future Provision

Double tracking is planned by the BNSF for several locations between Port Chicago and Bakersfield. It is understood that the BNSF have no plans to install additional tracks in locations where double tracking is already provided. The Shafter Viaduct spans over two existing BNSF tracks and so no provision for future tracks has been considered necessary. The geometry of the Shafter Crossover Structure has therefore been established on the basis of two BNSF tracks only.

6.4 Summary of Analysis

The reinforced concrete box girder spans are classified as standard structures and do not fall within the scope of this preliminary design; they have been modeled where necessary in accordance with the Seismic Design Criteria, to ensure that the behavior of the crossing structure is fully representative.

All sections have been checked for resonance effects, rail serviceability and track-structure interaction limits, and force demands. The design of the Shafter Crossover Structure is similar to the Conejo Crossover Structure as seen in Appendix A. This includes the substructure design, superstructure composite section design, span length, and column layout. The sections were checked for the Conejo Crossover Structure. In all cases, the structure has been found to be satisfactory. Although the overall lengths of the crossover structures differ, the maximum length of each thermal unit does not exceed that of the Conejo Crossover Structure. Therefore, it is assumed that the Conejo Crossover Structure is an adequate representative of the crossover design used for the Shafter Crossover.

Based upon the calculations it appears that the preliminary designs are in full compliance with the TMs and are capable of being developed into a fully compliant design solution. For the complete analysis and results justifying the design of Shafter Crossover Structure, see Conejo Crossover Structures Calculations report which has been attached in Appendix C.

6.4.1 Vertical Frequency Check

A third row of columns has been added to keep the transverse span length less than 115 feet which satisfies the lower bound frequency limit per TM 2.10.10. The vertical frequency for this span length, as originally analyzed for the Conejo Crossover Structure with two rows of columns (as seen in Appendix C), is marginal. Therefore, there is concern about reduction in vertical stiffness due to group reduction factor for the close spacing between the existing and additional row of columns. The reduced vertical stiffness in pile support may result in further reduction of vertical frequency and could be problematic in final design. From a soil-structure interaction perspective, the stiffness of a two-pile group will possess an equivalent axial stiffness that ranges between that of one to two individual piles.

As discussed in Section 2.4.1, a structure model containing one thermal unit has been created based on Wasco Crossover Structure geometry assuming a 50% reduction of single pile axial stiffness for each of the two rows of piles that are spaced less than three diameters center to center. See Figure 2.4-1
for an image of this model. Reduction in pile lateral stiffness has also been studied to demonstrate the effect does not govern the design. The results indicate that all analyzed cases satisfy the lower bound vertical frequency limit. There is no significant difference in vertical frequency between "Fixed 2 col", supported by calculations in Appendix C, and "0.5U1U2U3 Roller", analyzed with conservative assumptions. With the results, it is convincing that adding a third row of columns that are closely spaced to the existing row of columns have minimum impact on structure vertical frequency. The analysis for the Wasco Crossover Structure shall also apply for the Shafter Crossover Structure.

6.5 Limits of Standard Bridge Design and Special Bridge Design

The boundary spans adjacent to the crossover structure have the standard span length and cross section, and are considered as standard structures. Therefore, the standard bridge design is suitable for use on spans from bent 1 to bent 35, bent 40 to bent 42, bent 45 to bent 65, bent 68 to 70, bent 71 to bent 109, and from bent 113 to bent 121. The crossover structure itself occupies the section of viaduct between bent 70 and bent 71 and is the subject of the analysis comparable to the Conejo Crossover Structure.

6.6 Construction Methods Assessment

The assumed method and sequence of construction for the crossover structure is to construct the CIDH shafts alongside the BNSF right-of-way line. These piles will be extended as columns in a second stage concrete pour. Subsequently it is assumed that the lower part of the column cap beam will be formed and cast on falsework to provide a temporary seat onto which the precast beams can be placed.

Each beam will have a lift weight of approximately 60 to 70 tons and the erection lift radius is likely to be approximately 100 to 130 feet.

It is assumed that beams will be lifted from the east side of the structure straight from the delivery truck using a mobile crane. It is expected that as beam placement is a relatively quick operation, this can be done between trains running on the BNSF, though the BNSF should be consulted to confirm the acceptability of this approach. Some beams adjacent to expansion joints may require additional concrete for the joints to be cast onto them as a second stage pour prior to erection.

Once a section of beams between expansion joints is placed, the deck slab in that area can be cast to produce the final slab structure. Stay-in-place forms will be required between beams per BNSF guidelines. The deck pour is also assumed to include the upper half of the column capping beam which allows the beams and deck to act monolithically with the column cap and columns.

The constraints specific to the crossover structure suggest that a particular method of erection will most likely be used by contractors. This does not rule out other methods of construction. It is likely that contractors will prefer to use methods that they have used successfully in the past. The assessment described here represents a subset of methods that could be used.

6.7 Temporary Construction Loadings Considered

No specific loadings have been considered for the temporary stages described.

6.8 Temporary Construction Easements

A general temporary construction easement of 100-foot width has been identified on one side of the crossover structure with a 10-foot width on the other side. These TCEs extend for the full length of the crossover structure. The side of the structure that has the 100-foot width was chosen as the side that appears to have easiest connection to the local roadway network. It is expected that a 100-foot TCE will be sufficient to accommodate the access and crane requirements for beam placement.

6.9 Traffic or Pedestrian Diversion and Control

The construction of the standard viaduct is expected to be supplied from along the route. At the crossover structure there is access to the local roadway system via Santa Fe Way and it is expected that these routes will be the primary means for supplying beams and construction materials to the worksite. As this is a rural area it is anticipated that only localized traffic control measures will be required at the site entrances at peak work times.

Section 7.0

Lone Star Spur Crossing

7.0 Lone Star Spur Crossing

The Shafter Viaduct is 16,195 feet in length and composed of three sections: the northern standard viaduct, the BNSF crossover, and the southern standard viaduct (RS 15% Drawings). The BNSF Crossover Structure is discussed in Chapter 6.0 of this report. Both the northern and southern standard viaducts have instances where a span larger than the 120-foot standard span is required to cross local facilities. At these locations, a three- or four-span segment of continuous concrete box girder is implemented to reach larger spans. The northern standard viaduct has three instances of multispan balanced cantilever continuous construction spanning E Lerdo Highway, BNSF Railways, S Beech Avenue, and E Los Angeles Avenue.

The Lone Star Spur Crossing is a part of the southern standard viaduct of the Shafter Viaduct where the proposed Lone Star Spur realignment is crossed through a set of continuous concrete box girder spans. This is the location of the longest continuous concrete box girder section in CP4 and therefore governs the design of all other continuous concrete box girder spans along Wasco and Shafter Viaducts.

7.1 Structure Form

The span crossing over the proposed Lone Star Spur realignment is 232 feet spanning the spur track assumed right-of-way of 25 feet at a 30-degree skew and a 15-foot maintenance clearance assumed around HSR foundations (PE4P CP4 Drawings). The span is achieved through three spans of continuous concrete box girder superstructure with integral bents. The continuous spans are respectively 143 feet, 232 feet, and 145 feet with a vertical clearance of 24 feet and 11 inches within the BNSF right-of-way. The foundations are rotated 45 degrees in order to minimize the span length while achieving the assumed foundation maintenance clearance.

The structure depth is similar to the shape of the bending moment diagram where the structure depth increases at the integral bent connections as seen in Figure 7.1-1. The middle span of the a set of continuous concrete box girder has a curved soffit with a maximum depth of 23 feet 0 inches at the ends and 12 feet 0 inches at the center. The adjacent side spans taper from 23 feet 0 inches deep to 10 feet 6 inches deep. The aerial spans are formed using 10-foot-6-inch-deep precast, prestressed reinforced concrete box girders that range in length from 100 feet to 120 feet. The PE4P width of concrete superstructure is 43 feet 0 inches.

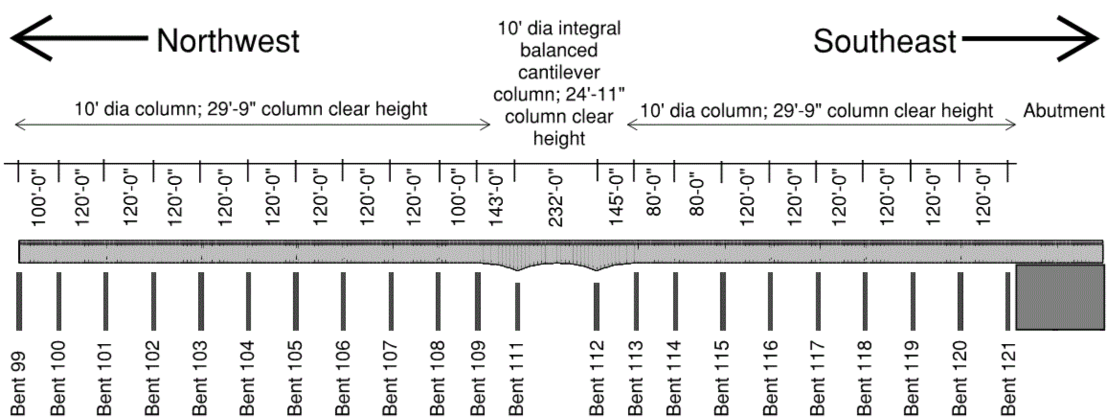

Figure 7.1-1
Lone Star Spur Crossing Column and Span Geometry

Each end of the continuous construction segment (bents 109 and 113) is articulated by a roller bearing which allows for displacement in the longitudinal direction due to expansion in the structure. This complies with the maximum limit from the fixed point to the free point of the structure (i.e., structural thermal unit) of 330 feet presented in TM 2.10.10. Therefore, no rail expansion joints are required.

The standard spans of the viaduct are formed from precast, prestressed box girders and seated on reinforced concrete columns, which are in turn supported on a pile cap with a group of 4 no. 6-foot-6-inch-diameter CIDH piles. Similarly, the integral bent columns are supported on a pile cap with a group of 4 no. 6-foot-6-inch-diameter drilled shaft piles. These foundations are rotated 45 degrees in plan as mentioned previously.

Balanced cantilever construction method or cast-in-place construction with formwork can be used to erect the continuous concrete box girder superstructure.

7.2 Structure Importance Classification

TM 2.3.2 paragraph 2.2.1 defines all structures supporting the high-speed tracks as primary structures because they will be required to be reinstated to allow resumption of train service after an earthquake.

This classification implies the following:

- Design life is 100 years.
- Seismic design must comply with TM 2.10.4.
- When applying the AASHTO LRFD code, values for the importance, ductility, and redundancy factors, hI, hD, and hR have been chosen as follows:
  - Importance factor hI = 1.05.
  - Ductility factor hD = 1.05 for strength calculations.
  - Redundancy factor hR = 1.05 for nonredundant elements, 1.0 otherwise.

7.3 Key Design Features and Site Constraints

7.3.1 BNSF/Lone Star Spur

The proposed BNSF/Lone Star Spur passes under HSR structure on a skew, and therefore, results in a longer span at the crossing. The proposed BNSF/Lone Star Spur is assumed to have 50-foot right-of-way. HSR structure is required to maintain 24-foot-0-inch vertical clearance across the proposed BNSF/Lone Star Spur right-of-way. In addition, adjacent HSR footing shall comply with TM 1.1.21 Section 6.1.8 for maintenance clearance. These have resulted in the decision to use a 232-foot span for this crossing.

7.3.2 Drainage Concept

The track drainage for the Shafter Standard Viaduct and Lone Star Spur Crossing will be carried from deck level to permanent drainpipes fitted within the void of the concrete deck girders. The drainpipes will be connected to downpipes cast into the columns. The downpipes will discharge to a detention basin, convey flows to a nearby stormwater collection system, or deliver the water into swales underneath the viaduct that would serve as detention basins and, within rural floodplains, allow the water to soak away.

7.3.3 Ground Conditions

Geotechnical advice is based on historic borehole records from Caltrans projects located in the vicinity of the route, as no local borehole data were available. The foundation spring stiffness has therefore been based upon the lower-bound interpretation of the soil parameters, using the nearest borehole data and engineering judgment. Detailed design will be based on investigation results which are expected to demonstrate that this approach is conservative.

See the Geotechnical Design Report in Appendix A for details.

7.4 Analysis Methodology

The reinforced concrete box girder spans are classified as standard structures and do not fall within the scope of this preliminary design. They have been modeled where necessary in accordance with the Seismic Design Criteria, to ensure that the behavior of the crossing structure is fully representative.

The complex continuous concrete girder sections, at the Lone Star Spur Crossing, are not explicitly checked for resonance effects, rail serviceability and track-structure interaction limits, and force demands. This is because the analysis of nonstandard and complex structures took place at a time when the preferred route option, or LEDPA, had not yet been selected and the continuous concrete girder spans along WS1 were not selected for analysis. Nevertheless, the compliance with the span to depth ratio and structural thermal unit limit provided in the TMs imply that long span continuous concrete girder structures, such as the Lone Star Spur Crossing, are capable of being developed into a fully compliant design solution.

The depth to span ratio of continuous concrete girder could be optimized by performing additional analysis. Prestressing model can be used to study vertical load cases. Vertical frequency shall also be checked while optimizing the depth for longer span structures. For lateral analysis, finite element model of the continuous concrete girder spans plus additional adjacent boundary spans will be used to capture track-structure interaction behavior. Further discussion of analysis/design can be found in Section 1.0.

7.5 Limits of Standard Bridge Design and Special Bridge Design

The boundary spans adjacent to the Lone Star Spur Crossing have the standard span length and cross section, and are considered as standard structures. Therefore, the standard bridge design is suitable for use on spans from abutment 1 to bent 35, bent 40 to bent 42, bent 45 to bent 65, bent 68 to 70, bent 71 to bent 109, and from bent 113 to abutment 121. The Lone Star Spur Crossing itself occupies the section of viaduct between bent 109 and bent 113 and is the subject of this section.

7.6 Construction Methods Assessment

The Lone Star Spur Crossing is proposed to be post-tensioned continuous concrete box girder with integral bents. Both cast-in-place construction and precast balanced cantilever construction can be used at contractor’s choice.

7.6.1 Cast-in-place Construction

Concrete box girders are typically constructed by cast-in-place methods in California. The traditional cast-in-place construction requires temporary shoring and falsework, as well as additional clearance provisions to take into account space occupied by falsework. At Lone Star Spur Crossing, vertical clearance is 24 feet 1 inches. A minimum rail road clearance of 23 feet and 6 inches is to be maintained for the Lone Star Spur rail road. Therefore, if cast-in-place construction is used to construct the Lone Star Spur Crossing, the superstructure would need to be constructed prior to the realignment of the Lone Star Spur to avoid temporary closure.

7.6.2 Precast Balanced Cantilever Construction

Precast balanced cantilever construction is usually selected when access of falsework construction is limited or vertical clearance is not enough for the roadway below. Also, cast-in-place construction is typically slow, requiring large labor efforts for the falsework, shoring placement, and removal. Precast balanced cantilever construction is another viable construction scheme for spanning over Lone Star Spur. Superstructure can be cast in segments off site and erected in place symmetrically at Bent 111 and Bent 112.

None of these erection methods excludes other methods of construction from consideration. It is likely that contractors will prefer to use methods that they have used successfully in the past. The assessment described here therefore represents a subset of methods that could be used.

7.7 Temporary Construction Loadings Considered

No specific loadings have been considered for the temporary stages described.

7.8 Temporary Construction Easements

A general temporary construction easement of 15-foot width outside of the permanent right-of-way has been indicated at the Lone Star Spur Crossing. At the structure location this gives a total corridor width of 80 feet which is considered sufficient for the foreseeable requirements for construction of such a structure.

7.9 Traffic or Pedestrian Diversion and Control

Work over and adjacent to the Lone Star Spur will be subject to the agreement of BNSF and is likely to include restrictions on working over the live railway and requirements for railway closure and rail traffic diversion during key stages of the construction.

Section 8.0

Other Structures

8.0 Other Structures

Section 1.3 describes the method of classification of structures for design. Under this classification the standard structure is the 120-foot-span viaduct girder. The bulk of this report has been concerned with complex and nonstandard parts of the major viaducts. However, the simpler structures required for hydraulic crossings, wildlife crossings, and retention of embankments in constrained locations fall under the description of nonstandard structures and so are pertinent to this report. As the majority of these structures also support the HSR directly, they are also classified as Primary Structures.

8.1 Box Culverts

The locations of hydraulic crossings have been identified in the 15% Record Set Drawings as an indicative centerline. No additional site-specific details have been developed for these structures for the preliminary engineering for procurement (PE4P) design as the requirements for each crossing are subject to agreement with the relevant Irrigation or Flood Control Districts that have jurisdiction in the locale.

General details of typical culvert structures have been developed to inform the CP4 bidder. These details cover typical forms of culvert structure that may be required and include one-cell, two-cell, and three-cell structures.

The detail designers should note that if multicell structures are proposed, the risk of the dividing walls collecting debris during flood conditions will be the concern of local jurisdictions. The structure is likely to require additional measures to prevent such debris from obstructing flow, such as inclined “cut-water” walls that encourage debris to be pushed up above the flow during a flood.

Local jurisdictions are likely to require the ability to dam off the structure to permit maintenance and inspection access to the internal surfaces. The typical details indicate grooves for the insertion of stop beams, but the precise details and locations of these features should be agreed upon during detailed design.

Preliminary section sizing has been carried out on the basis of a range of cells (1 to 3 cells), spans (10 feet and 15 feet), heights of openings (5 feet or 10 feet), and height of embankment above the top of the structure from 6 feet to 30 feet. These dimensions are summarized in the typical details drawing. The minimum cover to the top of the structure required by the design criteria is 6 feet.

No specific seismic analysis has been conducted. It is assumed that the structure sections will be designed for “at-rest” lateral earth pressures.

Typical cross section details are shown in Figures 8.1-1 to 8.1.3 below.

8.1.1 Construction Details

The design concept makes no specific assumption regarding the construction of culvert structures and it is likely that a variety of methods will be used throughout CP4. Where the construction site is in open country with the ability to use temporary diversions over long periods, the structures may be constructed in situ. Where the site is constrained either in extent or time available for construction, then precast culvert segments are likely to be favored. The 15% footprint makes allowance for temporary construction diversions at the location of all major hydraulic crossings.

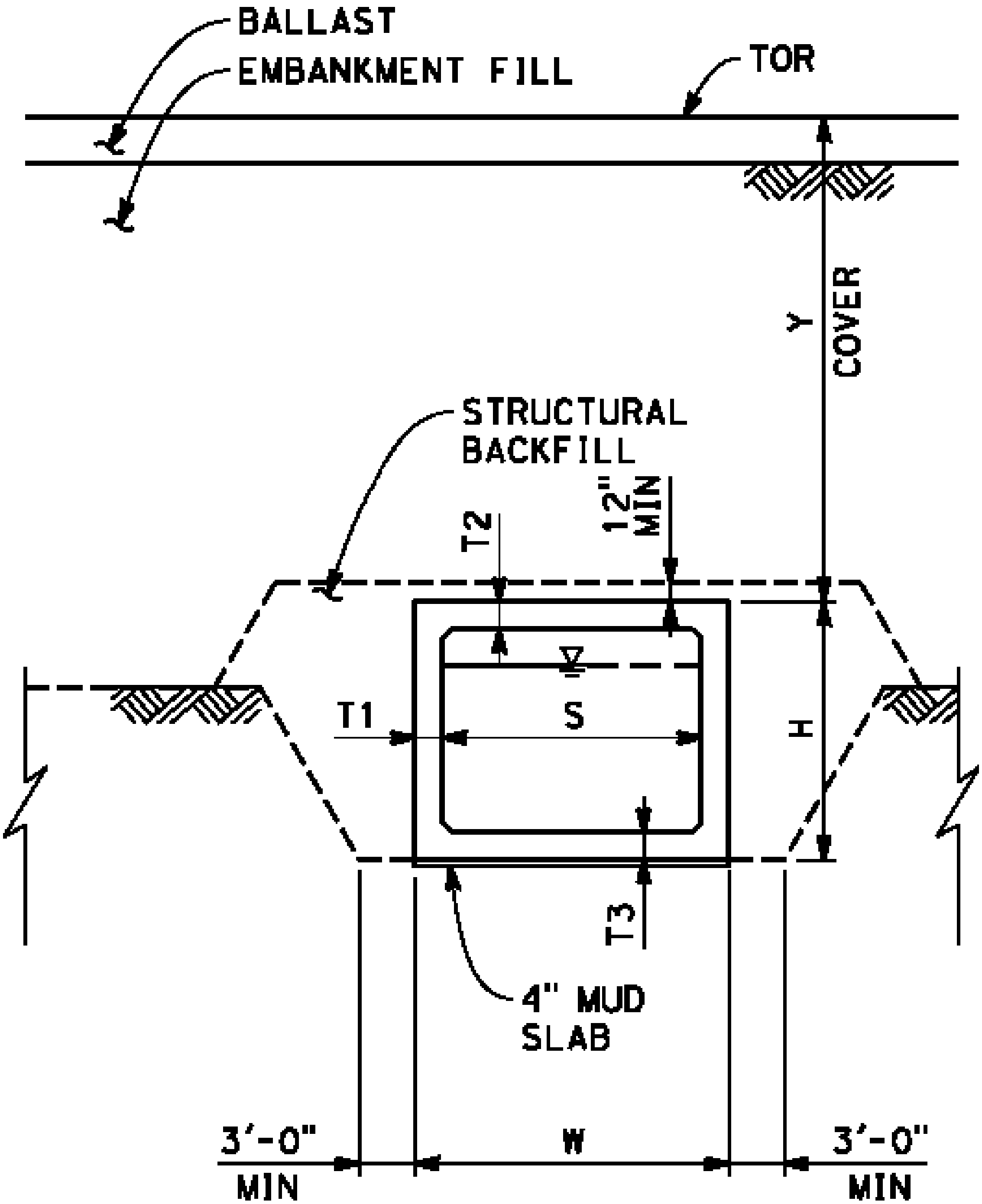

Figure 8.1-1
Typical Section – Single Cell Box Culvert

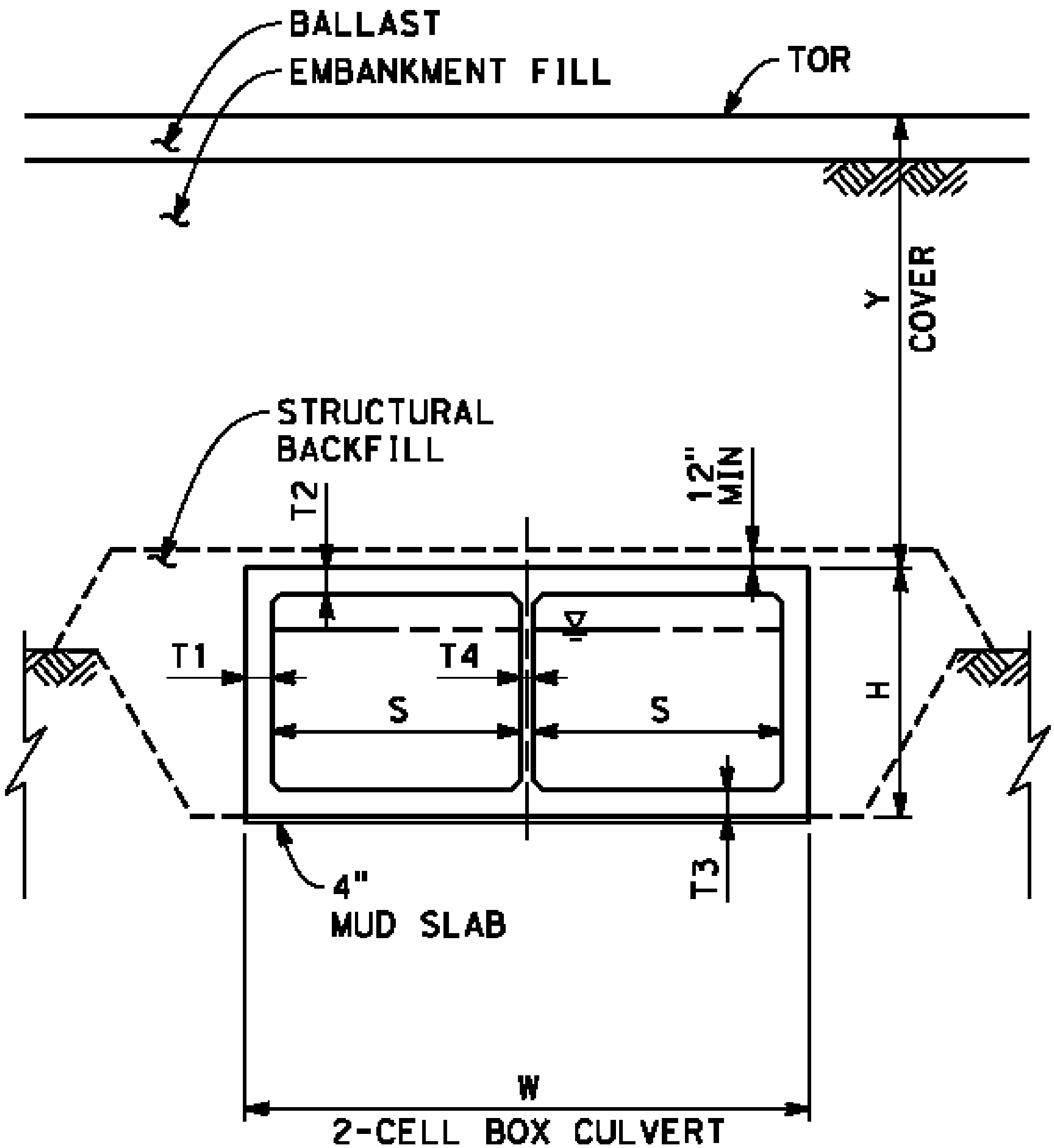

Figure 8.1-2
Typical Section – Two Cell Box Culvert

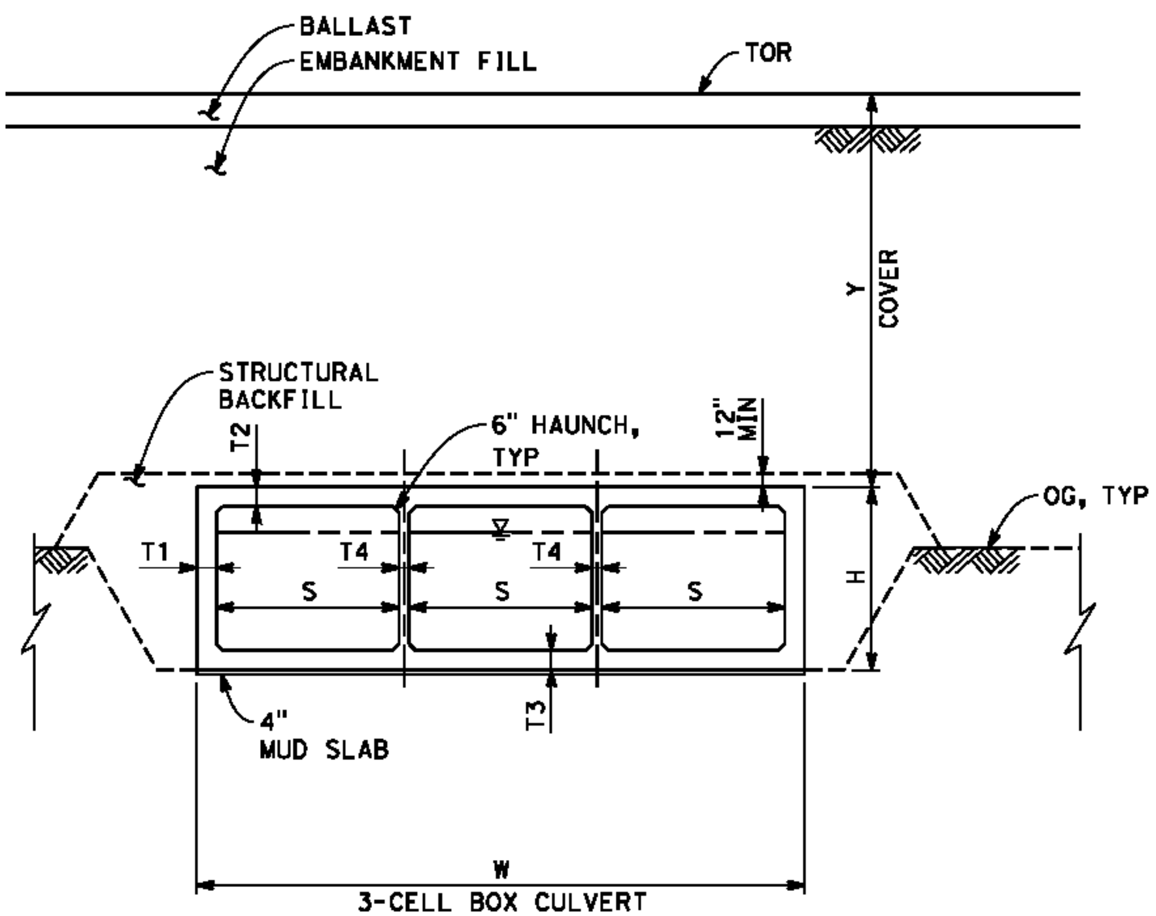

Figure 8.1-3
Typical Section – Three Cell Box Culvert

8.2 Wildlife Crossings

Details of the requirements for wildlife crossings are presented in the environmental report. In general these structures are wide to be nonthreatening to wildlife and have a low internal height.

Structurally these structures are similar to box culverts and the provisional details indicated above should be sufficient to form the basis of a detailed design.

8.3 Retaining Walls for Retained Embankments

Where the HSR rises above adjacent grade there is typically a transition from embankment to viaduct which includes a length of retained embankment. This transition zone has been adopted in the preliminary design at the direction of the Authority's representatives to limit the footprint requirements of the project.

The typical form of these retained embankments is assumed to be a mechanically stabilized earth (MSE) system. There are many commercial systems that are capable of being designed to provide this function so there has been no attempt to specify detailed requirements for these structures that may result in exclusion of some suitable products.

Due to the lack of available GI information, no assessment has been made regarding whether the subgrade soils would need to be treated either by ground improvement or piled raft foundations in order to support these structures. The 15% record set drawings indicate that piles may be required.

Typically the retained embankments begin at an embankment height of 15 feet and end at a viaduct abutment with a retained height of approximately 30 to 35 feet. This means that as the retained HSR corridor width is approximately 60 feet wide the height to width ratio of these embankments is generally much less than 0.5 and so global stability is not considered to be critical for design.

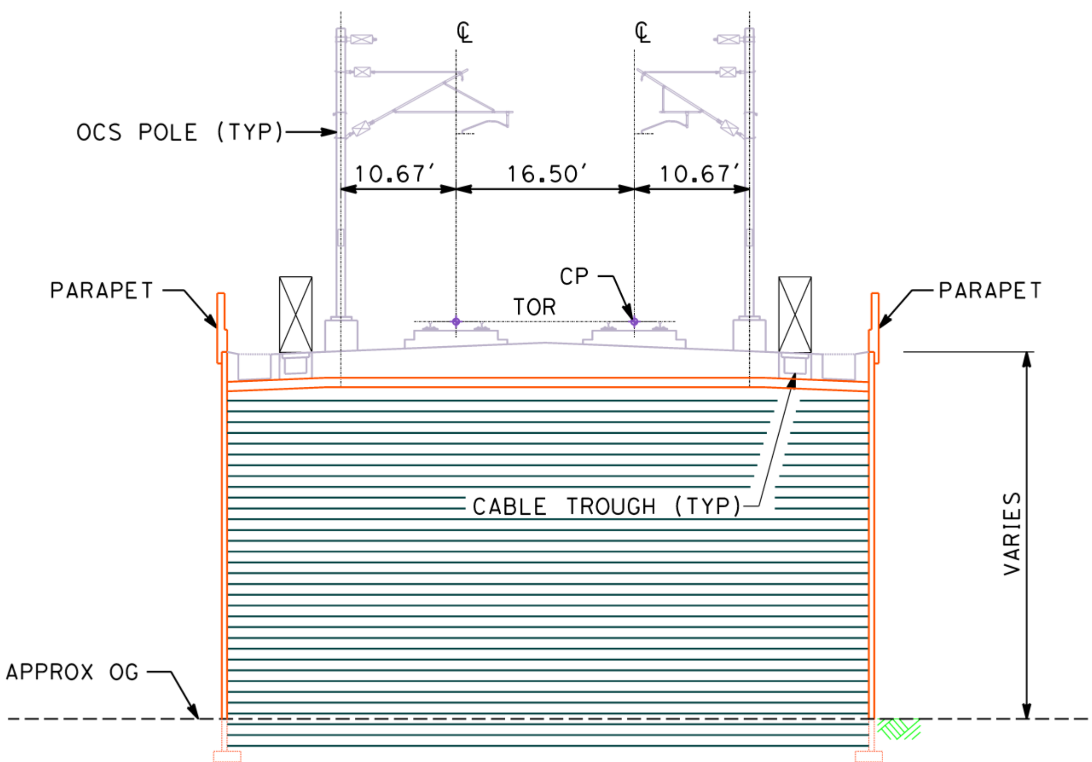

Figure 8.3-1
Typical Section – Retained Embankment

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Section 9.0

References

9.0 References

American Association of State Highway and Transportation Officials (AASHTO). 2007. *AASHTO LRFD Bridge Design Specifications*. 4th ed. Incorporating Caltrans Amendments Inserts.

California High-Speed Rail Authority. 2011. *Technical Memorandum 200.06 – Aesthetic Guidelines for Nonstation Structures R0*. November 3, 2011.

California High-Speed Rail Authority. 2013. *Technical Memorandum 1.1.21 – Typical Cross Sections for 15% Design*. August 20, 2013.

California High-Speed Rail Authority. 2011. *Technical Memorandum 2.3.2 – Structure Design Loads R2*. April 20, 2011.

California High-Speed Rail Authority. 2009. *Technical Memorandum 2.3.3 – HST Aerial Structure R0*. June 2, 2009.

California High-Speed Rail Authority. 2012. *Technical Memorandum 2.8.1 - Safety and Security Design Requirements R0*. March 12, 2012.

California High-Speed Rail Authority. 2011. *Technical Memorandum 2.9.10 - Geotechnical Analysis and Design R1*. May 22, 2011.

California High-Speed Rail Authority. 2011. *Technical Memorandum 2.10.4 – Seismic Criteria R1*. May 26, 2011.

California High-Speed Rail Authority. 2012. *Draft Technical Memorandum 2.10.10 – Track Structure Interaction R1*. February 29, 2012.

Caltrans Seismic Design Criteria (CSDC). 2010. Version 1.6. November, 2010.

Kleinfelder. June 24, 2011. *Ground Motions for Preliminary Design of California High Speed Rail Project, Seismic Ground Motion Zone Map*. (Extract from Ground motion report by Kleinfelder and SC Solutions provided to URS/HMM/ARUP JV on June 6, 2012).

URS/HMM/Arup Joint Venture. 2013. *Record Set 15% Design Submission Fresno to Bakersfield, Advance Planning Study*. California High-Speed Train Project. December 2013.

URS/HMM/Arup Joint Venture. 2014. *Record Set 15% Design Submission Fresno to Bakersfield Plans and Elevations and Typical Sections*. California High-Speed Train Project. May 2014.

URS/HMM/Arup Joint Venture. 2014. *Preliminary Engineering for Procurement Draft Submission Fresno to Bakersfield Sierra Subdivision Construction Package 4 Nonstandard and Complex Structure Plans*. California High-Speed Train Project. August 2014.

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Appendix A

Geotechnical Design Report

APPENDIX A

Fresno to Bakersfield Construction Package 4

Geotechnical Design Report for Nonstandard and Complex Structures

Prepared by:

URS/HMM/Arup Joint Venture

August 2014

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List of Abbreviations and Acronyms

bgs	below ground surface
Caltrans	California Department of Transportation
deg	degrees
HMM	Hatch Mott MacDonald
HSR	high-speed rail
in	inches
K	US Department of Agriculture Soil Erodibility Factor
ksf	Kips per Square Foot
mi	miles
mm	millimeters
$(N_1)_{60}$	Standard Penetration N-Values Corrected for Hammer Energy, Overburden Pressure, and Field Procedures
N_{60}	Standard Penetration N-Values Corrected for Hammer Energy
pcf	pounds per cubic foot
pci	pounds per cubic inch
SJV	San Joaquin Valley
yr	year

Section 1.0

Scope

A1.0 Scope

A1.1 Appendix Purpose

This appendix is presented as a geotechnical design report to address nonstandard and complex structures in Construction Package 4 (CP4). CP4 comprises a subsection of the alignment that extends from 1 mile north of the border between Tulare County and Kern County to about 7th Standard Road, north of Bakersfield.

This appendix presents geotechnical design calculations and recommendations calculated under a scope for Preliminary Engineering for Procurement (PE4P). The design presented in the main text of this report reflects the design of these structures as undertaken prior to October 2013. The design was based on geotechnical data available at that time, composed entirely of historical geotechnical information undertaken by others (primarily California Department of Transportation [Caltrans] sources).

Although reporting on recent site-specific geotechnical investigations has become available during the development of this appendix, these data have not been reviewed or considered in the design. The quality and coverage of the historical data used in the design is poor, limited to historical Caltrans boring logs often more than a mile from the proposed alignment. Thus there is potential that the recently collected data would lead to design changes. Redesign based on the new geotechnical information, and any resulting changes to the reference design, is outside the scope of services; however, observations are provided in this appendix regarding the applicability of the design presented herein that consider the data obtained from field geotechnical investigations in late 2013 in Tulare and Kern Counties.

A1.2 Relevant Structures

A list of the nonstandard and complex structures of CP4 is provided in Table 1.2-1 below. Refer to the *Sierra Subdivision Construction Package 4 Nonstandard and Complex Structure Report* for further details.

Table 1.2-1
Relevant CP4 Structures

No.	Purpose	Structural Type	Structure Class	Location (Beg. Station)	Length (ft)
10	Wasco Crossover (Part of Wasco Viaduct BNSF Crossing)	Crossover Beam/Slab Structure	Nonstandard	5661+30	1,326
13	Kimberlina Road Underpass	PC Concrete "bathtub" Beams	Nonstandard	5716+02	68
16	Lerdo Hwy Crossing (Part of Shafter Viaduct)	Continuous Concrete Box Girder	Complex	5994+70	585
18	BNSF Spur Crossing (part of Shafter Viaduct)	Continuous Concrete Box	Complex	6002+75	360
20	S Beech Ave Crossing (part of Shafter Viaduct)	Continuous Concrete Box Girder	Complex	6030+35	390

Table 1.2-1
Relevant CP4 Structures

No.	Purpose	Structural Type	Structure Class	Location (Beg. Station)	Length (ft)
22	Shafter Crossover (part of Shafer Viaduct BNSF Crossing)	Crossover Beam/Slab Structure	Nonstandard	6036+65	2,240
24	Lone Star Spur Crossing (part of Shafter Viaduct	Continuous Concrete Box Girder	Complex	6103+25	520

Section 2.0

Physiography and Geologic Setting

A2.0 Physiography and Geologic Setting

A2.1 Physiography

The topographic provinces included in this report are based on the United States Army Corps of Engineers topographic map (1962) and the physical model GIS layer. These reference sources cover the Fresno to Bakersfield (FB) portion of the alignment in its entirety but are out of date. Project-specific surveying data and light detection and ranging data, to be completed in the future, will be used to more fully describe the physiography and topography of this segment of the alignment.

As described by the *FB Geologic and Seismic Hazards Report* (GSHR; URS/HMM/Arup 2013), the high-speed rail (HSR) segment between Fresno and Bakersfield is located fully within the San Joaquin Valley (SJV) at an elevation between about 200 and 400 feet above sea level (ASL) and passes through gently undulating low relief terrain with shallow natural slopes through the urban areas of Wasco, Shafter, and Bakersfield. From the alignment's intersection with Highway 99 to the terminus of the study area east of Edison, the topography gently rises from about elevation 400 to 680 feet ASL as it flanks the southern foothills of the Tehachapi Mountains. The general physiography and topography of the SJV within the study area is shown on Figure 2.1-1. Superimposed upon this large-scale, relatively flat topography is a localized topography of river systems caused by recent incisions. This localized topography comprises short, steep river/stream banks with channels at lower elevations relative to the surrounding areas. These channel bottoms range between wide, relatively flat-bottomed (with occasional rounded natural levees) and narrow gully-type valleys, depending on their age and the amount of flow.

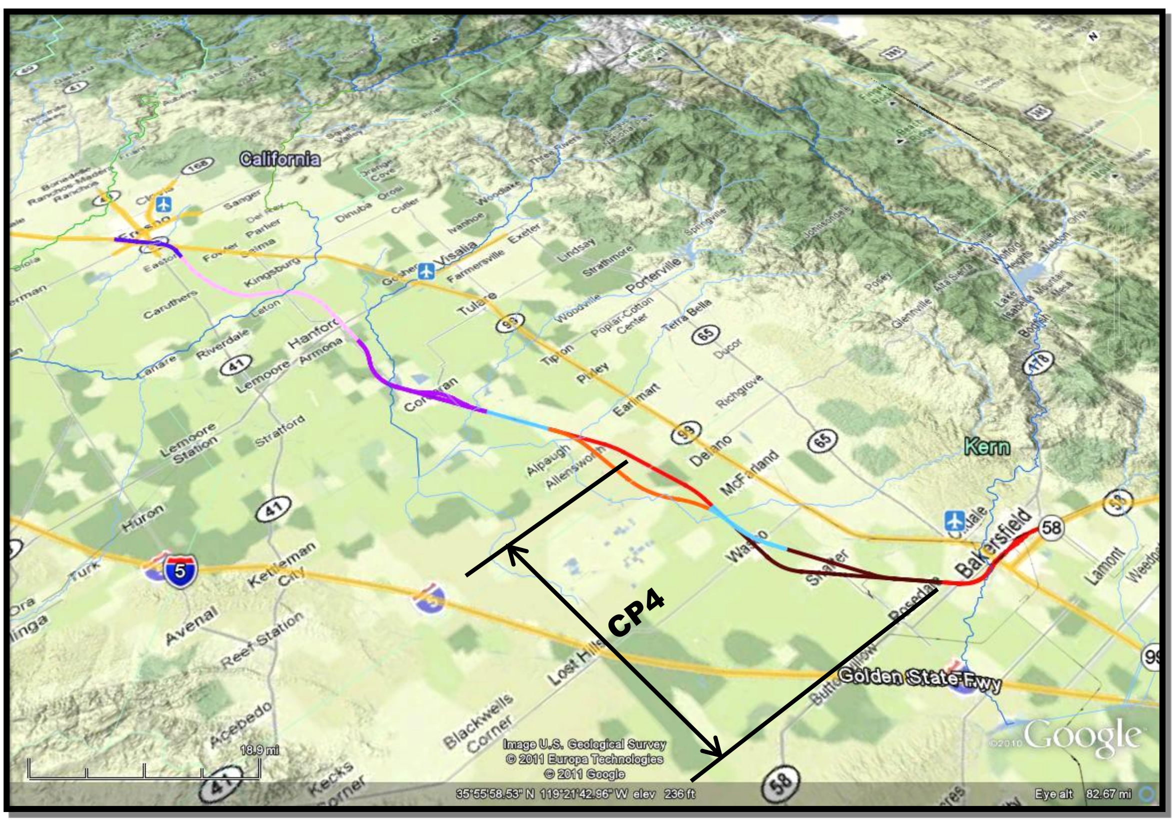

Figure 2.1-1
General Study Area Physiography and Topography (© 2011 Google Inc., 2011)

The topography along the CP4 corridor is generally flat but slopes gently to the south, varying between 219 and 350 feet relative to the North American Vertical Datum of 1988 (NAVD88). Localized variations on the ground surface elevation occur at existing road embankments, detention basins, and other man-made features such as irrigation canals and road and rail crossings.

A2.2 Geologic Setting

The SJV comprises the southern part of the approximately 400-mile-long Great Valley geomorphic province. The Great Valley geomorphic province is an asymmetric synclinal trough that is filled with sediments up to 30,000 feet thick. Infilling with sediments has occurred since the Jurassic period (>145 million years), providing a large, flat-lying alluvial plain setting in which the FB alignment corridor will be constructed. Bordering the Great Valley are mountain ranges, principally the Sierra Nevada ranges that represent the Sierra Nevada geomorphic province to the east and the Temblor and Diablo ranges associated with the Coast Ranges geomorphic province to the west (Figure 2.2-1). The Tehachapi Mountains and Klamath Mountains define the southern and northern limits of the Great Valley, respectively.

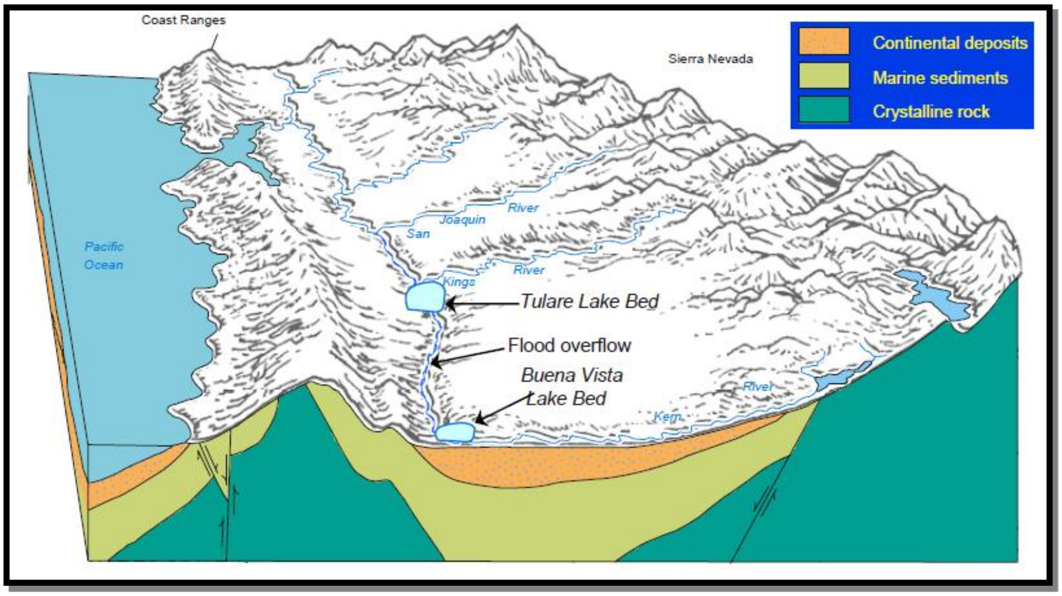

Figure 2.2-1
The Great Valley Geomorphic Province (Page 1986)

The SJV is a large sedimentary basin, but it provides for a somewhat varied geological setting. Given the asymmetry of the synclinal trough with its axis off center to the west (Norris and Webb 1990), basin sediments are deeper on the western side of the SJV compared with the eastern side. Southwestward tilting of the trough has also contributed to greater thickness of sediments at the southern end of the SJV compared with the northern end. Bedrock geology also differs from the east to west:

> To the east of the valley, the Sierra Nevada is composed primarily of pre-Tertiary granitic rocks and is separated from the valley by a foothill belt of Mesozoic and Paleozoic marine rocks and Mesozoic metavolcanic rocks along the northern one-third of the boundary. The Coast Ranges west of the valley have a core of Franciscan assemblage of late Jurassic to late Cretaceous or Paleocene age and Mesozoic ultramafic rocks. (Gronberg et al. 1998)

Such variability is testament to the tectonic environment in which the SJV is located and the interplay that this tectonic environment has had with the formation of the SJV to the present day.

Section 3.0

Seismic Setting

A3.0 Seismic Setting

The study area is within a relatively seismically quiescent region between two areas of documented tectonic activity: the Coast Ranges-Sierran Block boundary zone and San Andreas Fault system to the west and the eastern California shear zone to the east.

The Coast Ranges-Sierran Block contains potentially active blind thrust faults (Stein and Eckstrom 1992). The Pacific Coast Ranges contain many active faults that are associated with the northwest-trending San Andreas Fault System, which is the principal tectonic element of the North American-Pacific plate boundary in California. The eastern California shear zone accommodates a portion of the relative movement between the North American and Pacific plates.

A3.1 Faults and Seismicity

There are no known active faults crossing or within close proximity to the alignment within the study area. The San Andreas Fault, located approximately 45 miles west of the CP4 Alignment from the site, has the highest slip rate and is the most seismically active of any fault near the HSR alignment. The San Andreas, White Wolf, Garlock, Kern Canyon, Edison, and Tehachapi Creek Faults and other nearby faults are deemed "capable" by project standards and are described in detail in the FB GSHR (URS/HMM/Arup 2013). Capable faults within the study area are presented in Table 3.1-1.

Table 3.1-1
Capable Faults within 100 Miles of the Study Area

Fault Name	Fault Type	Slip Rate (mm/yr)	Distance and Bearing to FB HSR Alignment
San Andreas	Right-Lateral Strike-Slip	20–35	35 miles west of alignment at Wasco
Great Valley (Segments 10–14)	Blind Thrust	1.5	32 miles west of alignment at Wasco
Nunez	–	–	65 miles northwest of northern end of alignment
Clovis Fault	–	–	68 miles north of northern end of alignment
Corcoran Clay Fault Zone	Normal	–	North of the alignment from Hanford to the Kern/Tulare County line
Owens Valley	Right-Lateral Strike-Slip	1.5	84 miles northeast of alignment
Kern Canyon	Normal	–	55 miles east of northern end of alignment
Kern Front	Normal	–	12 miles east of alignment at Shafter
Kern Gorge	Normal	–	18 miles east of alignment at Shafter
Buena Vista	Thrust	-	23 miles south of southern end of alignment
Southern Sierra Nevada (Independence Section)	Normal	0.1	87 miles northeast of northern end of alignment
Oil Field Fault Zone[a]	Normal	–	30–35 miles east of southern end of alignment

Garlock	Left-Lateral Strike-Slip	2–10	45 miles southeast of southern end of alignment
White Wolf	Left-Lateral Reverse	3–8.5	30 miles southeast of southern end of alignment
Breckenridge	Normal	–	40 miles east of alignment at Shafter
Poso Creek/Pond	Normal	–	Crosses alignment approximately 3 miles south of border between Tulare and Kern Counties
Wheeler/Pleito	Normal	1.4	30 miles south of southern end of alignment
Edison Fault	Normal	–	22 miles southeast of southern end of alignment
Southern Sierra Nevada (Haiwee Reservoir)	Normal	7–14	65 miles east of alignment
[a] These faults appear on the Caltrans 1996 Seismic Hazards Map but have apparently have been de-rated since they do not appear on the Caltrans 2007 Deterministic Peak Ground Acceleration Map. Source: SCEC 1999, WGCEP 2007, Caltrans 2007, U.S. Geological Survey, California Geological Survey 2010			

The Pond Fault and Pond-Poso Creek Fault are discussed in detail in the GSHR (URS/HMM/Arup 2013) and were determined not to be part of the "capable" Pond Fault. Where the Pond-Poso Creek's concealed or assumed trace crosses the CP4 alignment, the track bed is at-grade.

A3.2 Seismic Design Criteria

Procedures for defining the seismic design parameters for the HSR are defined in Technical Memorandum 2.10.4. The ground motion package for design will be provided by the California High-Speed Rail Authority under a separate cover.

Section 4.0

Geologic and Seismic Hazards

A4.0 Geologic and Seismic Hazards

Refer to the GSHR (URS/HMM/Arup 2013) for detailed discussion of ground-related hazards.

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Section 5.0

Geotechnical Conditions

A5.0 Geotechnical Conditions

This section presents geotechnical data and preliminary design recommendations in support of CP4 structures based on historical geotechnical data along the HSR study area. No site-specific geotechnical investigation was available for the preliminary design of the structures (e.g., bridges and elevated structures) in CP4 of the FB Section of the HSR alignment. The Regional Consultant compiled the historical data largely from (limited) Caltrans sources.

A5.1 Historical Boreholes

The primary source of publicly available geotechnical data is the Caltrans collection of as-built construction records. Caltrans data are concentrated along major roadways, from projects dating between 1953 and 1997. For each project, several boreholes were drilled, logged, and (often) plotted on a cross section. None of the Caltrans records contain laboratory test data.

The majority of the 43 historical boreholes reviewed for this report are between 5 and 8 miles offset from the CP4 alignment and extend to a maximum depth of 87 feet below ground surface (bgs). Two historical Caltrans sites are within 0.5 miles of the alignment, both at Poso Creek Bridge. An indication of the coverage of historical information is provided by Figure 5.1-1, and the historical boreholes are presented in detail in the CP4 *Geotechnical Data Report* (URS/HMM/Arup 2014). Because the historical data are not generally proximate to the proposed structures, and the data in those boreholes indicate ground conditions similar to those encountered in the historical boreholes of CP2-3, the design parameters for CP4 were adapted from those calculated for CP2-3.

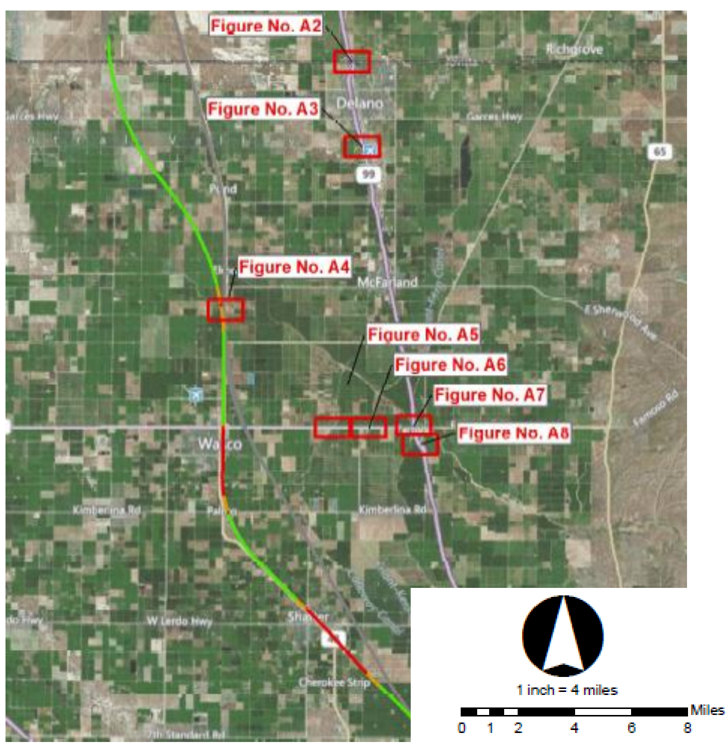

Figure 5.1-1
Coverage of Historical Geotechnical Data for CP4

A5.2 Stratigraphy

General overview of soil stratigraphy anticipated along CP4 alignment has been present in GSHR Sections 3.9.7 through 3.9.9 and 3.8.7 through 3.8.9.

The GSHR divides the FB alignment into several subsections by geomorphology and physiography. Table 5.2-1 presents a summary of the GSHR stratigraphy's, based on the very limited historical geotechnical data. The alignment subsection descriptions are not critical for this appendix, but are used to differentiate the typical stratigraphy in the table below.

Table 5.2-1
Summary of Stratigraphy Along CP4 Alignment Based on Historical Data

FB-G Rural South	FB-H Wasco and Shafter	FB-G Bakersfield North
No data available relevant to CP4	0–15 ft bgs Very loose to loose fine to coarse sands and soft to stiff sandy silts. (N = 3–12) OR Very loose-to-dense sandy silts, silty sands, and fine-to-medium sands. (N = 8–39)	0–15 ft Loose to slightly compact silty, fine-to-medium and fine-to-coarse sands. (N = 14–17)
	15-30 ft bgs Medium dense to dense fine to coarse sand and stiff fine sandy silts. (N = 22–28)	15–30 ft Dense to very dense sands and compact sandy silts. (N = 28–32) Up to 45 ft (N > 60)
	> 30 ft bgs (up to 80 ft bgs) Very dense silty clayey fine to medium dense sands. (N = 43–50)	

Subsurface soils are expected to be of mostly alluvial or lacustrine origin.

Valley basement bedrock is generally regarded to be greater than 30,000 feet bgs for much of the CP4 alignment.

A5.3 Laboratory Testing

No laboratory testing data are included with the historical Caltrans boring logs.

A5.4 Groundwater Levels

A review of historical data nearest piled foundation structures and expectations of the locations and conditions considered possible in these areas indicate the depth to groundwater may transition from somewhat shallow depth (5 feet bgs) at the southern end of Tulare County to greater than 100 feet bgs

in Shafter. For purposes of preliminary design, the groundwater table has been assumed to be 5 feet bgs in CP4.

A5.5 Ground Model

For the interpretation of the very limited historical geotechnical data, a "typical" ground model has been developed for use for all project structures. This ground model, presented in Table 5.5-1, has been assumed to represent a credible geotechnical situation, but not the softest (or stiffest) possible.

By definition, "worst credible" can be taken to mean that 70% of the geotechnical conditions will be better than the typical ground model and about 30% of conditions will be worse. However, this definition is applied for convenience only and in no way implies the existence of data sufficient to convey accuracy or any statistical treatment.

Table 5.5-1
Design Soil Profile for Piled Structures

Soil Design Parameters	Sand A	Sand A	Sand B	Sand C	Sand D	Sand E	Sand F
	(AGWT)	(BGWT)	(BGWT)	(BGWT)	(BGWT)	(BGWT)	(BGWT)
Depth of layer (ft)	0–5	5–10	10–25	25–45	45–65	65–75	>75
N-Value Corrected for Hammer Energy, N_{60} (blows/ft)	10	10	15	10	12	15	50
Friction Angle, ϕ' (deg)	30	30	32	30	31	32	41
Total Unit Weight, γ (pcf)	120	120	120	120	120	120	120
Young's Modulus, E (ksf)	106	106	159	106	127	159	529
Modulus of Horizontal Static Subgrade Reaction, $K_{h,\,static}$ (pci)	58	40	40	40	40	40	80
Modulus of Horizontal Cyclic Subgrade Reaction, $K_{h,\,cyclic}$ (pci)	29	20	20	20	20	20	40

A5.6 Liquefaction

Liquefaction risk was discussed in the GSHR (URS/HMM/Arup 2013).

The assessment of potentially liquefiable soils will require more rigorous investigation by the design-builder to quantify risks and consequences at specific bent locations.

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Section 6.0

Design

A6.0 Design

HSR structures are assumed to be supported on driven or cast-in-drilled-hole piles. While they are used for some highway structures in the southern SJV, shallow foundations were not evaluated for support of HSR structures.

A6.1 Pile Design

The magnitude of anticipated axial and lateral column loads drive the assumption that piled foundations are necessary for elevated structures, including overpasses, viaducts, and bridges. Geotechnical input to the design comprised independent single-pile analyses to develop axial, lateral, and rotational spring stiffness. Spring stiffness is provided as a function of applied load to capture nonlinear behavior such as lateral deformation.

Implementation of appropriate spring stiffnesses enable structural models to mimic nonlinear pile head response related to soil-structure interaction with the assumed ground profile. It is intended that spring stiffness is determined using the tables provided in this section, based on the magnitude of applied load, loading rate (static of cyclic), and pile-cap fixity condition for each foundation pile.

The cases considered for each loading condition are summarized below:

- Lateral load case.
  - Free and fixed pile head.
  - Static load and cyclic load soil stiffness.
- Bending moment case.
  - Static load and cyclic load soil stiffness.
- Vertical load case.
  - Axial stiffness response under (equivalent) static load.

Both 6.5- and 9-foot-diameter piles have been evaluated for the above cases, assuming a minimum pile length at least equal to approximately 18 times shaft diameter (115 and 160 feet, respectively). For all analyses, pile head was assumed to begin from 10 feet bgs, to allow for pile cap construction. If a pile would be located in a river channel environment where scour would apply, the structural team assumed the pile head would be 20 feet deeper. Pile spring stiffnesses were determined by performing uncoupled analysis to estimate displacement and rotation at the top of a single pile subject to applied horizontal forces, vertical forces, and bending moments. Further details are provided in the subsections that follow.

Limitation of pile head displacement in accordance with project design criteria will provide for a reasonable proportioning of the foundations. While the axial pile stiffness provides an indication of achievable capacity, specific pile bearing capacity estimates and force distribution in pile groups is not included in the scope of this report. For further information on structural modeling and pile design, refer to the main body of this report.

A6.1.1 Stiffness Response under Lateral Load and Applied Moment

Single pile response to horizontal load and bending moment were evaluated using the geotechnical software LPILE6. The LPILE analysis was undertaken in accordance with the API and Matlock & Reese methods recommended in American Association of State Highway and Transportation Officials Section A10.2. For simplicity, only the short-term concrete modulus was used in calculation; the influence of a

long-term concrete modulus is considered negligible by comparison with the uncertainties inherent in more significant assumptions regarding ground conditions.

Both fixed and free pile head conditions were modeled to bound the range of responses possible for variable fixity. The fixed-head rotational stiffness was calculated using an imposed bending moment from the loading conditions provided by the structural team. Rotational stiffness from applied moment was not calculated for the free-head case.

The results of the analyses are presented in Table 6.1-1 to Table 6.1-6.

Table 6.1-1
9-Foot-Diameter Pile: Stiffness Matrix of Pile Head Response to Applied Horizontal Load – Free-Head Condition

Horizontal Applied Load (kips)	Pile Head Static Response		Pile Head Cyclic Response	
	K_{p-y} (kips/in)	$K_{p-\theta}$ (kips/rad)	K_{p-y} (kips/in)	$K_{p-\theta}$ (kips/rad)
0	12,500	-494,600	965	-361,900
200	1,500	-494,600	965	-361,900
400	1,500	-492,900	915	-330,700
600	1,100	-295,600	640	-185,500
800	1,000	-242,500	605	-168,700
1,000	930	-217,500	590	-159,100
1,200	830	-198,700	585	-158,600
1,400	710	-175,200	580	-155,200
1,600	625	-159,900	570	-152,200
1,800	540	-140,800	525	-139,800
2,000	450	-115,500	445	-116,100

Table 6.1-2
9-Foot-Diameter Pile: Stiffness Matrix of Pile Head Response to Applied Horizontal Load – Fixed-Head Condition

Horizontal Applied Load (kips)	Pile Head Static Response	Pile Head Cyclic Response
	K_{p-y} (kips/in)	K_{p-y} (kips/in)
0	3,555	2,255
200	3,555	2,255
400	3,330	1,825
600	2,620	1,680
800	2,615	1,605
1,000	2,460	1,485
1,200	2,310	1,415
1,400	2,245	1,370
1,600	2,150	1,315
1,800	1,945	1,250
2,000	1,625	1,185

Table 6.1-3
9-Foot-Diameter Pile: Stiffness Matrix of Pile Head Response to Applied Bending Moment

Applied Bending Moment (kips x in)	Pile Head Static Response		Pile Head Cyclic Reponse	
	K_{M-y} (kips x in/in)	$K_{M-\theta}$ (kips x in/rad)	K_{M-y} (kips x in/in)	$K_{M-\theta}$ (kips x in/rad)
0	495,000	-90,000,000	362,000	-77,510,000
22,000	495,000	-90,000,000	362,000	-77,510,000
44,000	495,000	-90,000,000	362,000	-77,205,000
66,000	385,000	-42,200,000	278,000	-35,770,000
88,000	260,000	-30,150,000	191,000	-25,770,000
110,000	240,000	-28,350,000	175,000	-24,320,000
132,000	230,000	-27,820,000	165,000	-23,565,000
154,000	224,000	-27,400,000	162,000	-23,285,000
176,000	220,000	-27,020,000	159,000	-23,005,000
198,000	213,000	-25,400,000	155,000	-21,965,000
220,000	202,000	-22,400,000	148,000	-19,270,000

Table 6.1-4
6.5-Foot-Diameter Pile: Stiffness Matrix of Pile Head Response to Applied Horizontal Load – Free-Head Condition

Horizontal Applied Load (kips)	Pile Head Static Response		Pile Head Cyclic Response	
	K_{p-y} (kips/in)	$K_{p-\theta}$ (kips/rad)	K_{p-y} (kips/in)	$K_{p-\theta}$ (kips/rad)
0	1,000	-244,000	630	-177,000
50	1,000	-244,000	630	-177,000
100	1,000	-244,000	630	-177,000
150	1,000	-244,000	630	-177,000
200	1,000	-244,000	630	-177,000
250	1,000	-241,000	510	-125,000
300	805	-167,000	445	-100,000
350	727	-142,000	420	-91,000
400	685	-127,000	405	-85,000
450	660	-120,000	400	-84,000
500	615	-110,000	395	-82,000

Table 6.1-5
6.5-Foot-Diameter Pile: Stiffness Matrix of Pile Head Response to Applied Horizontal Load – Fixed-Head Condition

Horizontal Applied Load (kips)	Pile Head Static Response	Pile Head Cyclic Response
	K_{p-y} (kips/in)	K_{p-y} (kips/in)
0	2,300	1,450
50	2,300	1,450
100	2,300	1,450
150	2,300	1,450
200	2,300	1,200
250	1,900	1,100
300	1,700	1,100
350	1,700	1,050
400	1,700	1,050
450	1,700	1,000
500	1,650	990
1,200	-	710
1,520	-	495
1,700	-	330

Table 6.1-6
6.5-Foot-Diameter Pile: Stiffness Matrix of Pile Head Response to Applied Bending Moment

Applied Bending Moment (kips x in)	Pile Head Static Response		Pile Head Cyclic Response	
	K_{M-y} (kips x in/in)	$K_{M-\theta}$ (kips x in/rad)	K_{M-y} (kips x in/in)	$K_{M-\theta}$ (kips x in/rad)
0	245,000	-33,140,000	178,000	-28,270,000
5,000	245,000	-33,140,000	178,000	-28,270,000
10,000	245,000	-33,065,000	178,000	-28,208,000
15,000	245,000	-32,990,000	178,000	-28,140,000
20,000	245,000	-32,910,000	178,000	-28,075,000
25,000	219,000	-19,360,000	156,000	-15,905,000
30,000	148,000	-12,235,000	111,000	-10,695,000
35,000	133,000	-11,275,000	96,000	-9,590,000
40,000	126,000	-10,880,000	89,000	-9,135,000
45,000	120,000	-10,570,000	86,000	-8,965,000
50,000	118,000	-10,435,000	84,000	-8,825,000
107,700	-	-	63,400	"
114,600	-	-	37,250	"
117,100	-	-	22,650	"

" Similar value as previous increment has been assumed.

A6.1.1.1 Stiffness Response under Axial Load

In estimation of single pile axial stiffness, two different approaches were implemented. The first method employs a methodology proposed by Fleming (1992) in the paper "A New Method for Single Pile Settlement Prediction and Analysis." The second method is based on methodology proposed by Reese et al. (2006) in "Analyses and Design of Shallow and Deep Foundations." Both methods model the settlement of a single pile under incremental vertical loading to develop a vertical stiffness.

The lower stiffness of the two responses has been adopted, generally derived from the Reese et al. (2006) method. The variation of axial stiffness with increasing vertical load was observed to be minimal for vertical loads within the range anticipated for design. Therefore, only a single axial stiffness has been provided in Table 6.1-7 for each of the pile sizes evaluated.

Table 6.1-7
Vertical Stiffness under Axial Load

Pile size	$K_{t\text{-}z}$ (kips/in)
9-ft dia.	10,750 (for up to ~4,100 kips applied)
6.5-ft dia.	4,840 (for up to ~ 2,000 kips applied)

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Section 7.0

Limitations and Further Information

A7.0 Limitations and Further Information

The procurement package design effort for CP4 is based on extremely limited information included in historical geotechnical reports. As a consequence, there may be significant changes necessary in detailed design. The results of this report should be considered preliminary and refined by the design-build teams during final design once site-specific information is available.

As discussed in Section A1.0, a limited but project-specific geotechnical investigation has recently been completed along the CP4 corridor; however, this information has not been used in the reference design or in generating the parameters and recommendations of this appendix. The impression of ground conditions provided by a brief review of this recent data suggests the advice provided in this document is generally reasonable for reference design purposes.

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Section 8.0

References

A8.0 References

American Association of State Highway and Transportation Officials. 2010. *Load and Resistance Factor Design (LRFD) Bridge Design Specifications*. 5th ed.

California Department of Transportation (Caltrans). 1953a. *Clinton Avenue Overcrossing, Log of Test Borings*.

Caltrans. 1953b. *North Fresno Undercrossing, Log of Test Borings*.

Caltrans. 1963. *South Fresno Viaduct, Log of Test Borings*.

Caltrans. 1990. *Clinton Ave. O.C. (Widen), Log of Test Borings*.

Caltrans 1996. *Caltrans Seismic Hazards Map and A Technical Report to Accompany the Caltrans California Seismic Hazards Map (Based on Maximum Credible Earthquakes).*

California Geological Survey. 1997 (rev.2008). *Guidelines for Evaluating and Mitigating Seismic Hazards in California, California Division of Mines and Geology (CDMG) Special Publication 117*.

California Geological Survey. 2009. *Alquist-Priolo Earthquake Fault Zones*. http://www.conservation.ca.gov/cgs/rghm/ap/Pages/Index.aspx.

California Geological Survey. 2010. *Fault Activity Map of California*. Geologic Data Map No. 6. http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html.

Central Valley Testing, Inc. 2005. *Geotechnical Engineering Investigation, Tract No. 5614, West Bullard Avenue West of North Grantland Avenue, Fresno, California*. Prepared for Sterling Development.

City of Fresno. 2010. *Water Quality Annual Report 2010*.

Fleming, W.G.K. 1992. "A New Method for Single Pile Settlement Prediction and Analysis." *Geotechnique* 42, No. 3, pp. 411-425.

Fresno Irrigation District (FID) et. al. 2006. *Fresno Area Regional Groundwater Management Plan*.

Huntington, Gordon L. 1971. *Soil Survey, Eastern Fresno Area, California*. United State Department of Agriculture, Soil Conservation Service.

Jenkins, O.P. 1965. *Geological Map of California Fresno Sheet, Division of Mines and Geology*.

Jennings, C.W. 1994. *Fault activity map of California and adjacent areas with locations and ages of recent volcanic eruptions: California Department of Conservation, Division of Mines and Geology Data Map Series No. 6.* pp. 92. 2 plates, map scale 1:750,000.

Krazan & Associates, Inc. 1987. *Preliminary Geotechnical Engineering Investigation, Tract 3881, Sommerset No. 3. Fresno, California*. Prepared for Keterson Development.

Krazan & Associates, Inc. 1991a. *Preliminary Geotechnical Engineering Investigation, Tract No. 4229, Fresno, California*. Prepared for Trend Homes.

Krazan & Associates, Inc. 1991b. *Preliminary Geotechnical Engineering Investigation, Tract No.4304, Fresno, California.* Prepared for Trend Homes.

Krazan & Associates, Inc. 1991c. *Preliminary Geotechnical Engineering Investigation, Tract No. 4320, Fresno, California*. Prepared for Trend Homes.

Krazan & Associates, Inc. 1993. *Preliminary Geotechnical Engineering Investigation, Proposed Residential Development Tract 5414, Cornelia Avenue Near McKinley Avenue, Fresno, California*. Prepared for DS Ventures, LLC.

Krazan & Associates, Inc. 1994a. *Preliminary Geotechnical Engineering Investigation, Tract No.4384, Fresno, California*. Prepared for Trend Homes.

Krazan & Associates, Inc. 1994b. *Preliminary Geotechnical Engineering Investigation, Proposed Residential Development Tract 5325, West Gettysburg and North Polk Avenues, Fresno, California*. Prepared for Century Builders.

Krazan & Associates, Inc. 1997. *Preliminary Geotechnical Engineering Investigation, Proposed Residential Development Tentative Tract No. 5512, Cornelia Avenue Near Clinton Avenue, Fresno, California*. Prepared for Rabe Engineering, Inc.

Page, R.W. 1986. *Geology of the fresh ground-water basin of the Central Valley, California, with texture maps and sections: United States Geological Survey, Professional Paper 1401-C*.

O'Neill, M.W. and Reese, L.C. 1999. *Drilled Shafts: Construction Procedures and Design Methods.* FHWA-IF-99-025.

Reese, L.C., Isenhower, W.M., and Wang, S.T. 2006. *Analyses and Design of Shallow and Deep Foundations*. Wiley & Sons.

SC Solutions. 2011. *California High-Speed Train Project – 30% Design Ground Motions*.

Seed, R.B. et al. 2003. *Recent Advances in Soil Liquefaction Engineering: A unified and consistent framework.* 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, Keynote Presentation, H.M.S Queen Mary, Long Beach, California.

Soils Engineering, Inc. 2005*. Preliminary Soils Investigation for Vesting Tentative Tract No. 5316 Located at the Southeast Corner of West Dakota Avenue and North Hayes Avenue in Fresno, CA*. Prepared for Centex Homes.

Technicon Engineering Services, Inc. 2004. *Preliminary Geotechnical Engineering Investigation, Proposed Single-Family Residential Subdivision Tract No. 5368, Polk Avenue, Fresno, California*. Prepared for Highland Partners Group, Inc.

Technicon Engineering Services, Inc. 2006. *Preliminary Geotechnical Investigation Report, Proposed Tract 5400 Residential Subdivisions. SEC of Hayes and Gettysburg Avenues, Fresno, California*. Prepared for Lennar Fresno, Inc.

Technicon Engineering Services, Inc. 2007. *Preliminary Geotechnical Investigation Report, Proposed Single-Family Residential Subdivision Tract No. 5600*. Grantland and Barstow Avenues, Fresno, California. Prepared for the McCaffrey Group, Inc.

The Twining Laboratories, Inc. 1991*. Geotechnical Engineering Investigation*. Tentative Tract 4282 and 4385. West Dakota Avenue and North Polk Avenue. Fresno, CA. Prepared for Monte Vista Development.

Unruh, J.R. and Moores, E.M. 1992. *Quaternary blind thrusting in the southwestern Sacramento Valley.*

URS/HMM/Arup Joint Venture. 2012. *Geologic and Seismic Hazards Report 15% Record Set: Fresno to Bakersfield Section*. California High-Speed Train Project.

URS/HMM/Arup Joint Venture. 2012. *Final Geotechnical Data Report Contract Package 1: Fresno to Bakersfield Section*. California High-Speed Train Project.

URS/HMM/Arup Joint Venture. 2011. *Geology, Soils and Seismicity Technical Report: Fresno to Bakersfield Section*. California High-Speed Train Project.

U. S. Department of Agriculture (USDA) and Natural Resources Conservation Service (NRCS). 2008. *Soil Survey Geographic (SSURGO) database for Eastern Fresno Area County, California.* Fort Worth, Texas. http://SoilDataMart.nrcs.usda.gov.

U.S. Federal Highway Administration. 2010. *Drilled Shafts: Construction Procedures and Load and Resistance Factor Design (LRFD) Design Methods*. FHWA-NHI-10-016.

U.S. Geological Survey (USGS). 2005. *Preliminary integrated databases for the United States - Western States: California, Nevada, Arizona, and Washington: U.S. Geological Survey Open-File Report OFR 2005-1305, U.S. Geological Survey, Reston, Virginia, USA*.

U.S. Geological Survey (USGS). 2006. *Quaternary Fault and Fold Database for the United States*. http//earthquakes.usgs.gov/regional/qfaults/.

U.S. Geological Survey (USGS). 2008. *Documentation for the 2008 Update of the United States National Seismic Hazard Maps.*

Youd T. L. et al., 2001. *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils J. Geotech.* Geoenvironmental Engineering Volume 127, Issue 10, pp. 817-833.

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Appendix B

Conejo Crossover Structure Report

APPENDIX B Conejo Crossover Structure Report

This appendix summarizes the design and detailed analysis results for the Conejo Crossover Structure. As the Conejo Crossover structure satisfies all of the HSR design criteria it is clear that the crossover structures in CP4 with the same maximum span, Wasco Crossover (1,326 feet long) and Shafter Crossover (2,240 feet long), can also be designed to satisfy the design criteria.

1.0 Conejo Crossover Structure

The Conejo Viaduct is 5,049 feet in length and composed of three sections: the E Conejo Avenue standard viaduct, the BNSF crossing, and the S Peach Avenue standard viaduct. The BNSF crossing structure is considered to be nonstandard and complex, and is the subject of this analysis.

For this analysis, the BNSF crossing portion was originally conceived as a 950-foot-long elevated slab, supported on multiple columns to either side of the BNSF railroad corridor. The 6-foot-diameter crossover columns are positioned at 30-foot centers along the length of the structure and are founded on a single 9-foot-diameter drilled shaft pile. The columns had a maximum span of 106 feet at the widest span (see Figure 1.0-1). To accommodate a revised span width of 115 feet, piers were moved resulting in an increase in the length of the structure, which is now 1,429 feet in length. To confirm that the concept of the structure at the new length was still valid, a local model consisting of the governing thermal unit with the maximum span length of the extended structure was analyzed to confirm that frequencies and seismic performance met the design criteria. The local model analysis showed that in order to remain within the lower frequency boundary a second line of columns is necessary to stiffen the span of the structure. These columns were added to limit the span to 115-foot. This modification of the structure to increase the end stiffness confirms that the original analysis model can be regarded as conservative.

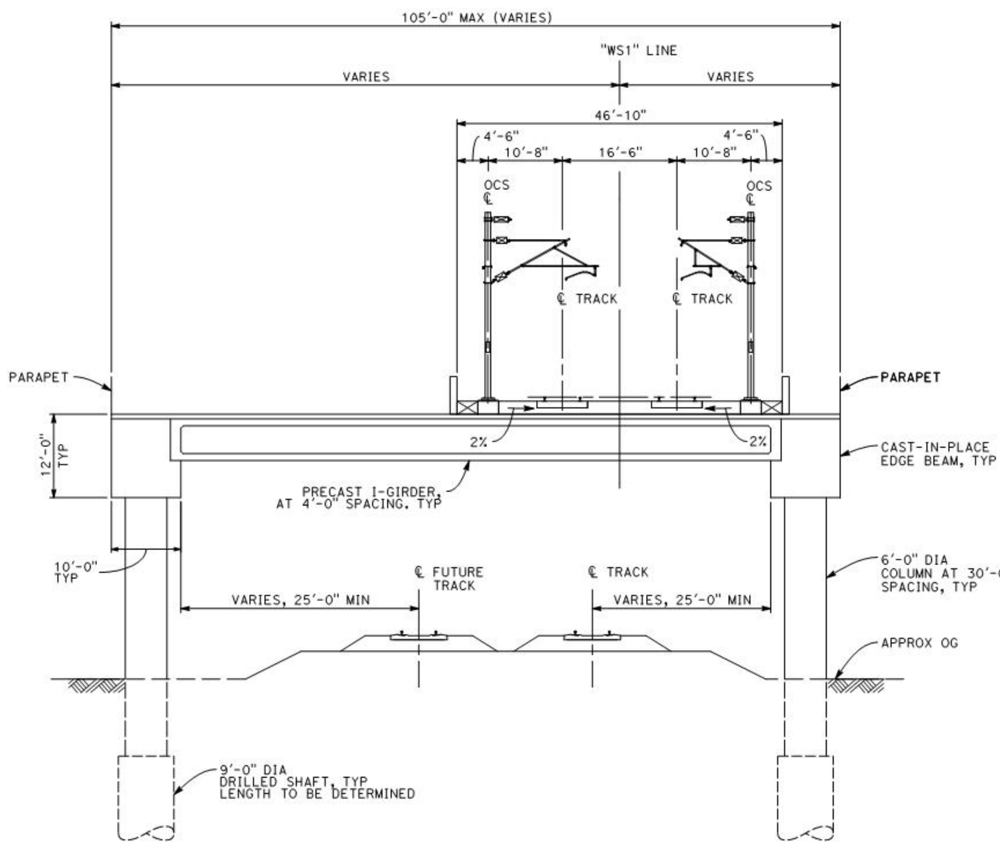

Figure 1.0-1
Conejo Crossover Structure Section - Original two-column bent configuration

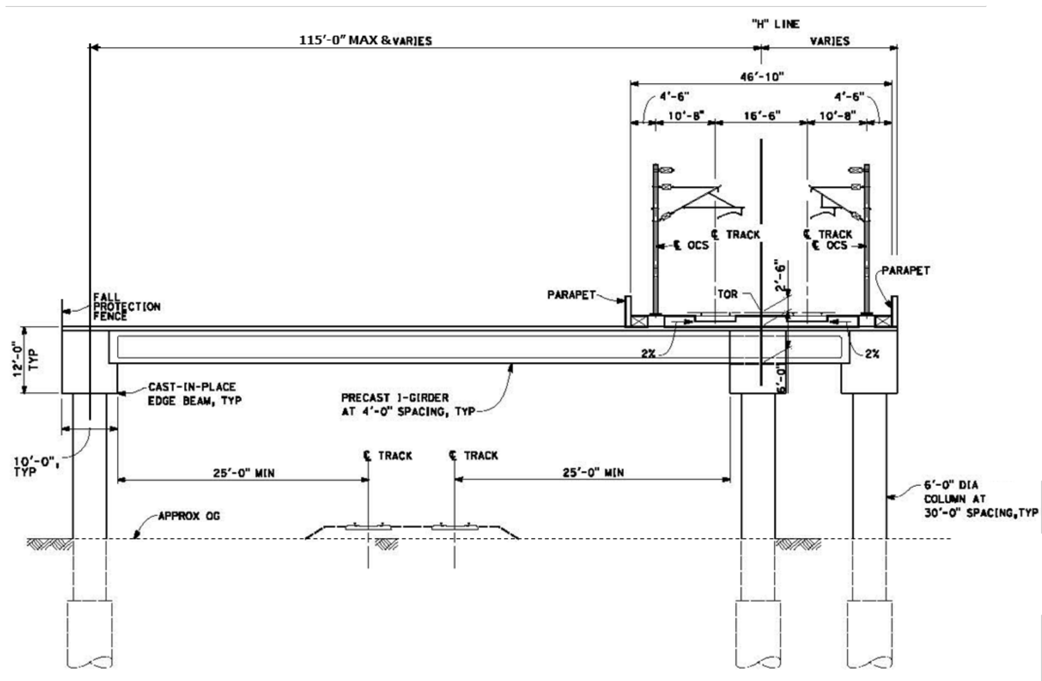

Figure 1.0-1

Conejo Crossover Structure Section - Modified three-column bent configuration where Conejo deck width exceeds the 115-foot span maximum

The slab section is constructed from 6-foot-deep, precast, PC beams and supported on 12-foot-deep by 30-foot span in situ concrete column cap beams, which run parallel to the railway. The beams span approximately perpendicular to the railroad tracks and are placed immediately adjacent to one-another; typically this gives a spacing of 4 feet on centers. The deck slab is 6 inches in thickness and is intended to act compositely with the beams. The superstructure has been divided into individual thermal units of approximately 150- to 200-foot length to reduce the thermal displacement and force effects. Movement between adjacent thermal units of the slab is controlled by dowelled connections, which allow relative longitudinal and vertical displacements but not relative transverse displacement. A similar dowelled connection is provided between the end panel of the slab and the adjacent span of the standard viaduct.

The standard spans of the viaduct are formed from precast, prestressed box girders and seated on RC columns, which are in turn supported on a pile cap with a group of 4no. 6-foot-6-inch-diameter drilled shaft piles. Due to reduced loading, the columns immediately adjacent to the crossover structure modify the general foundation arrangement by using a two-pile group with a narrower pile cap.

1.1 Structure Importance Classification

TM 2.3.2 paragraph 2.2.1 defines all structures supporting the high-speed tracks to be primary structures because they will be required to be reinstated to allow resumption of train service after an earthquake. This classification implies the following:

- Design life is 100 years.
- Seismic design must comply with TM 2.10.4.
- When applying the AASHTO LRFD code, values for the importance (hI), ductility (hD), and redundancy (hR) factors have been chosen as follows:

- h_I = 1.05.
- h_D = 1.05 for strength calculations.
- h_R = 1.05 for nonredundant elements, 1.0 otherwise.

1.2 Key Design Features and Site Constraints

1.2.1 Dowel Connections

Dowel connections are located at the breaks between adjacent thermal units of the deck slab and at the interface connections between the crossover structure and the standard viaduct sections. The purpose of the dowels is to control the relative movement between the thermal units and, in particular, the movement at the rails. The dowels are aligned to be parallel with the rail axes at the interface between the units to ensure that the relative structure movement is also along the rail axis. This ensures that lateral distortions are minimized. The dowels are assumed to allow relative rotation about the transverse axis and displacement in the longitudinal and vertical directions, but they limit all other degrees of freedom.

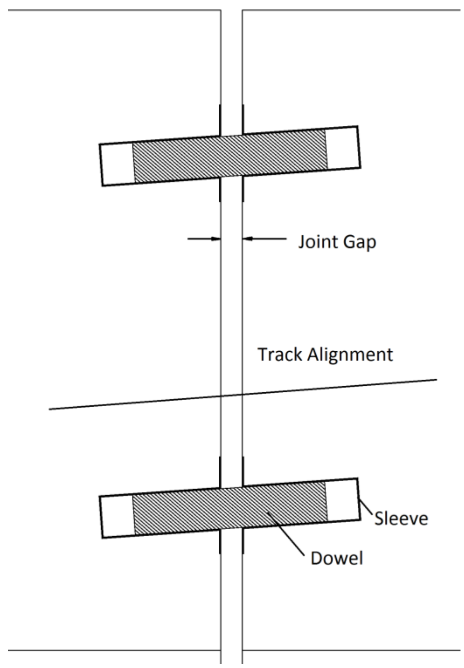

Figure 1.2-1
Detail of Dowels in One-Column Cap Beam

As the dowels are aligned with the rails, expansion joints between the adjacent thermal units are not required to be perpendicular to the rail and are not in this case. It has instead been assumed that the joints will be aligned parallel to the cross beams. This requires the joint design to consider a minor component of lateral displacement with longitudinal displacement, but this is considered to be within the capability of typically available structure joints. Alternatively, for the simplification of track clip arrangement the joint could be made to be perpendicular to the rail in the vicinity of the HSR tracks and revert to being parallel to the beams outside this area.

The merits of these variations should be investigated further during the design development stage.

1.2.2 Ground Conditions

The geotechnical parameters used for the analysis are based on historic borehole records from Caltrans projects located in the vicinity of the route, as no project-specific or local borehole data were available. The foundation spring stiffness has therefore been based upon the lower-bound interpretation of the soil parameters, using the nearest borehole data and engineering judgment. Detailed design will be based on investigation results, which are expected to demonstrate that this approach is conservative.

Appendix A design parameters and spring stiffness apply to analysis used for Conejo Crossover Structures.

1.2.3 BNSF Future Provision

Double tracking is planned by the BNSF for several locations between Port Chicago and Bakersfield. It is understood that the BNSF has no plans to install additional tracks in locations where double tracking is already provided. The Conejo Viaduct spans over two existing BNSF tracks, so no provision for future tracks has been considered necessary. The geometry of the Conejo crossover structure has therefore been established on the basis of two BNSF tracks only.

1.3 Summary of Analysis and Results

The PC box girder spans on either side of the Conejo crossover structure are classified as standard structures and do not fall within the scope of this preliminary design. They have been modeled, where necessary, in accordance with the seismic design criteria to ensure that the behavior of the BNSF crossover structure is fully representative.

All sections have been checked for resonance effects, rail serviceability and track-structure interaction limits, and force demands. In all cases the structure has been found to be satisfactory.

Based upon the calculations thus far, it appears that the preliminary designs are in full compliance with the TMs and are capable of being developed into a fully compliant design solution. Refer to the *Appendix C* for the complete analysis and results.

The main results are summarized in Tables 2.3-1 to 2.2-15.

1.3.1 Modeling

Both SAP and CSiBridge modeling programs were used for the analysis of the Conejo Viaduct. Several models of each section were required in order to represent the different conditions of the structure for different loading cases and for different design checks, in accordance with TM 2.10.4 and TM 2.10.10.

The structural columns, cross beams, rails, and RC girders were represented by stick elements. Piles were represented by nonlinear springs, using equivalent stiffness values to correctly model the soil structure interaction based upon soil parameters similar to those in Appendix A. The pile cap and pile group effects were modeled using rigid links connecting the top of the piles to the column elements. All standard viaduct spans were connected to the bent cap elements with linear bearing springs, with the bridge articulation represented by either pinned or rolling spring properties. In the case of the transverse frequency analysis, pinned restraints were added in place of the bearings, as only the flexibility of the superstructure is to be considered. Note that for the type of structure under consideration, the fixity requirement of TM 2.10.10 fully restrains the superstructure from all transverse movement.

Foundation arrangements for the standard spans were those used in the Authority's representative's design for the standard viaducts and have been used accordingly in the structural models. These foundations have been checked using LPILE and Pilset, and have been found to have adequate capacity.

Linear and nonlinear springs were used to represent boundary conditions and stiffness in the model. Nonlinear boundary springs were used to model the nonlinear behavior of rail clips and pile foundations. However, when running linear analyses such as model analysis and response spectrum analysis, these springs are assumed to operate in the linear stiffness range and are therefore modeled as linear boundary springs. In accordance with TM 2.10.10, upper and lower bound stiffness were taken into account as were upper and lower bound mass.

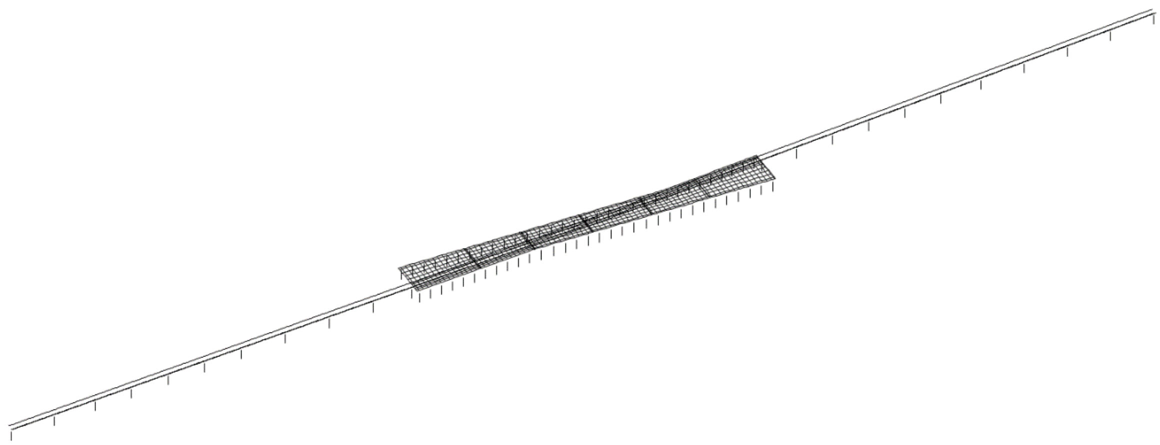

Figure 1.3-1
SAP Model

1.3.2 Frequency Results

The vertical, torsional, and transverse frequencies of the structure were evaluated to ensure that they meet the required dynamic criteria, as defined by TM 2.10.10. In the case of the vertical and torsional frequencies, two conditions were assessed: the first with upper bound mass and lower bound stiffness (Condition 1), the second with lower bound mass and upper bound stiffness (Condition 2). Condition 1 was also adopted for the transverse frequency analysis, as it generated the most onerous frequencies in this case.

In all thermal units of the crossover structure, the natural frequencies were found to be within the defined limits. The thermal unit with a transverse span of 74.2 feet and a column height of 35.5 feet produced the highest lower bound frequency limit with an effective span length of 62.9 feet. Whereas the unit with a transverse span of 100.4 feet and column height of 35.5 feet produced the lowest upper bound frequency limit with an effective span length of 74.3 feet. Although the original SAP model, representing the section in Figure 1.0-1, has transverse spans up to 100.4 feet the vertical frequency of the modified115-foot transverse span model, representing the section in Figure 1.0-2, is also checked against the limit. See Table 1.3-1 for an envelope summary of the limits and most onerous natural frequencies for all thermal spans. For span specific limits and natural frequencies, see the structural calculations in Appendix C. No torsional frequencies were found below 4.36 Hz for condition 1 and 5.22 Hz for condition 2.

Table 1.3-1
Conejo Crossover Structure Frequency Check Result Envelope

	Vertical Frequency L=100 ft (Hz)	Vertical Frequency L=115 ft (Hz)	Torsional Frequency L=100 ft (Hz)	Torsional Frequency L=115 ft (Hz)	Transverse Frequency (Hz)
Lower Limit	3.73	3.54	5.36 condition 1 6.33 condition 2	4.36condition 1 5.22 condition 2	1.2
Upper Limit	9.27	8.64	N/A	N/A	N/A
Condition 1	4.46	3.63	greater than 5.36	greater than 4.36	1.54
Condition 2	5.27	4.354	greater than 6.33	greater than 5.22	N/A

The fundamental frequency in the vertical direction is first observed in the modal results at the ends of the crossover structures, where the spans are at their longest due to the tapered geometry in plan. It has been found that the frequency in this direction is sensitive to the stiffness provided by the cross-beams and column sections, but also that it is particularly sensitive to the vertical stiffness of the foundations. Due to the soft soil case that has been considered in the design, the frequencies found are therefore also conservative.

It has been found that vertical frequency requirements govern the section dimensions of the crossover structure, with deeper sections needed to provide sufficient stiffness in order to satisfy TM 2.10.10. The section sizes specified are therefore larger than would be required from consideration of other effects such as strength.

As the vertical frequencies are governed in large part by the ground conditions, access to site-specific GI data may reveal more beneficial soil parameters and permit savings with the refinement of the design. This can be investigated in further development of the design.

1.3.3 Rail Serviceability and Track-Structure Interaction Results

The crossover structure was analyzed for deflections and rail stresses, and evaluated against the limits prescribed in TM 2.10.10. This included the assessment of global deflections of the structure, the relative rotations and displacements at the rails and expansion joints, and the relative twist of the deck.

Several SAP models were developed to model train loads at the most onerous locations on or immediately adjacent to the crossover structure. The various train locations were coupled with the load permutations and cases specified in TM 2.10.10 to envelope the worst deflections in the structure.

It has been demonstrated from the analysis that the Conejo Crossover Structure meets all of the requirements of TM 2.10.10 and that all rotations, deflections, and rail stresses are with limits. See Tables 2.3-2 to 2.3-8 for a summary of the results. Results shown are for the worst cases only. Joint-specific results can be found in the complete calculation report along with supporting calculations.

Table 1.3-2
Conejo Crossover Structure Track Serviceability Results (1)

Group	Vertical Deflection (in) L = 100 ft		Transverse Deflection (in) L = 286 ft	
	Limit	Conejo	Limit	Conejo
Group 1a	0.343	0.169	1.135	0.165
Group 1b	0.500	0.231	2.195	0.178
Group 3	N/A	N/A	3.546	0.503

Table 1.3-3
Conejo Crossover Structure Track Serviceability Results (2)

Group	Rotation about Vertical Axis (rad)		Rotation about Transverse Axis (rad)	
	Limit	Conejo	Limit	Conejo
Group 1a	0.0007	0.00017	0.0012	0.0008
Group 1b	0.0010	0.00003	0.0017	0.0013
Group 2	0.0021	0.00017	0.0026	0.0008
Group 3	0.0021	0.00057	0.0026	0.0010

Table 1.3-4
Conejo Crossover Structure Track Serviceability Results (3)

Group	Deck Twist (rads/10ft)	
	Limit	Conejo
Group 1a	0.0011	0.00104
Group 1b	0.0011	0.00009
Group 2	0.003	0.00110
Group 3	0.003	0.00121

Table 1.3-5
Conejo Crossover Structure Track Structure Interaction Results (1)

Group	Relative Longitudinal Displacement	
	Limit	Conejo
Group 4	1.806	1.543
Group 5	2.733	1.495

Table 1.3-6

Conejo Crossover Structure Track Structure Interaction Results (2)

Group	Relative Vertical Displacement	
	Limit	Conejo
Group 4	0.25	0.086
Group 5	0.50	0.071

Table 1.3-7

Conejo Crossover Structure Track Structure Interaction Results (3)

Group	Relative Transverse Displacement	
	Limit	Conejo
Group 4	0.08	0.019
Group 5	0.16	0.020

Table 1.3-8

Conejo Crossover Structure Track Structure Interaction Results (4)

Group	Permissible Axial Rail Stress	
	Limit	Conejo
Group 4	±14	5.5 to -4.6
Group 5	±23	9.1 to -2.3

1.3.4 Force Results

The key components of the crossover structure have been checked for structural adequacy to assess the validity of the section sizing. In addition to the crossover structure, sections of the typical viaduct that interface with the crossover were also checked. This included the box girder spans immediately adjacent to the crossover and the columns supporting these spans. The force checks comprised the RC design of the columns and pile caps, feasibility of the post-tensioned cross beams at the specified sizes, and the RC design of the piled foundation options.

Table 1.3-9

Column Strength Check – Load Case, Axial, and Flexural at Governing Locations

	Viaduct Column	
Load Combination	**Strength 1**	**Strength 5**
Axial Demand (k)	1,317	1,185
Moment M3 Demand (k-in)	141,369	56,066
Moment M2 Demand (k-in)	115,814	46,586
Demand/Capacity Ratio	0.911	0.468

Table 1.3-10
Pile Strength Check – Governing Axial/Moment Load Interaction per Pile

	Strength 5
Governing Axial Demand (k)	984
Flexural Demand (k-in)	165,231
Moment Demand/Capacity Ratio	0.853

1.3.4.1 Dowel Forces

The dowel elements have been modeled as nominal 12-inch-diameter steel pins, with 2 dowels placed at each joint on the crossover. The intermediate joints on the crossover are much broader than those between the crossover and typical viaduct, which would permit a greater number of dowel elements to be installed; reducing dowel stresses and diameters. The merits of a greater number of dowels can be evaluated in further design developments. For consistency, a 2 dowel configuration has been maintained in all joint locations in the structure.

The forces in the dowels have been determined and compared with the capacity of the 12-inch-diameter steel sections. In all load cases and configurations, the strength of the dowels has been found to be satisfactory. See Table 1.3-11 for a summary of the results.

Table 1.3-11
Conejo Crossover Structure Dowel Capacity Results

Load Case	Shear Force, V3		Bending Moment, M2	
	Capacity, V_r	Conejo	Capacity, M_r	Conejo
Strength 1	2620	727	6780	3757
Strength 5	2620	258	6780	1207

1.3.4.2 End-Span Check

The adoption of dowel connections at the joint between the crossover structure and the typical viaduct results in forces being transferred from the crossover into the adjacent viaduct spans (end-spans). These spans have therefore been checked for structural adequacy as part of the overall viaduct assessment.

The main variation between the end-spans and the standard spans is the torsional force that is induced in the box section due to the transverse load transfer from the dowels. The effects of the connection on the moments about the minor axis of the box section were also evaluated.

The check was conducted as a comparison between the shear stresses observed in the box section webs from the standard 120-foot-span sections, and the stresses in the Conejo Crossover Structure's end-span section. The shear stresses were derived from the applied shear and torsion forces, determined using the Conejo SAP models. The stresses in a 120-foot standard span were taken from the boundary spans in the Conejo Crossover Structure models.

The comparison shows that the forces transferred from the crossover increase the shear stresses in the webs of the end-span box girder by 20%. This is a manageable increase that can be accounted for by a modification of the box girder shear reinforcement. In the top and bottom flanges, the maximum shear stress increases by 65%, but it should be noted that the stresses in the flanges of the typical sections are initially small, and so stresses in the end-span sections are similarly small.

The design moments about the minor axis of the standard box girder are shown to decrease in the end-span section. This is attributed to the reduced fixity of the end-span provided by the column immediately adjacent to the crossover structure. As the bearings for only the one span are located over the centroid of the end column, in comparison with a typical intermediate column that is loaded eccentrically and by two spans, there is less resistance to the twisting of the column. When this is considered in terms of the transverse plane of bending, the end-column represents a pinned support in comparison to the rigid typical column supports. The maximum transverse moments in the column are therefore observed to be 25% less than those of the typical viaduct sections.

1.3.4.3 Thermal Load Effects

In developing the structure model it was initially thought that a 300-foot spacing of joints between panels of the structure slab would be satisfactory as this was close to the maximum thermal length requirements of TM 2.10.10. Initial test analysis runs showed that, contrary to the established design philosophy of the CSDC, seismic-induced loading would not be the primary driver of the design for these structures. These analyses showed that the design was primarily governed by both the frequency requirements of TM 2.10.10 and thermal loads when applied in the Strength 1 load combination.

Thermal loading was particularly dominant due to the rigid restraints provided by the columns to the superstructure, resulting in large forces being transferred from the column cap into the columns. This restraint also had the effect of constraining the thermal expansion of the superstructure at the ends of each respective thermal unit, resulting in downward hogging during thermal expansion and uplift during contraction.

To moderate these forces the model of the structure was revised to incorporate more frequent joints, typically at 150- to 180-foot spacing. This had the effect of substantially reducing the thermal effects. It is still possible that thermal loads may be the governing design case, though it is more likely that the seismic case will govern the design. Where thermal forces govern the design it may be prudent for the detailed designers to consider refining the joint spacing to further reduce the thermal forces.

The dowel connections between panels were also susceptible to high loads in the Strength 1 combination. The constraints provided by the dowels have the potential to restrict the natural thermal movement of the structure both transversely and vertically, due to the uplift/hogging effects. For this reason the dowels have been articulated to allow vertical displacement and rotation about the transverse axis in an effort to reduce the forces imposed in the elements while retaining the benefit of lateral restraint from having the dowels. The increase in numbers of joints as described above also led to a substantial reduction in dowel forces. Relative displacements and rotations between adjacent thermal units were found to be within limits with this configuration.

1.3.5 Seismic Results

1.3.5.1 Columns

The displacement capacity and displacement ductility demand of the columns were assessed in accordance with the CSDC. Each column has a 1 % reinforcement ratio. The reinforcing steel detail is shown in the following figure. The assessment was completed using a combination of global and local SAP models and running pushover analyses in both the X and Y directions.

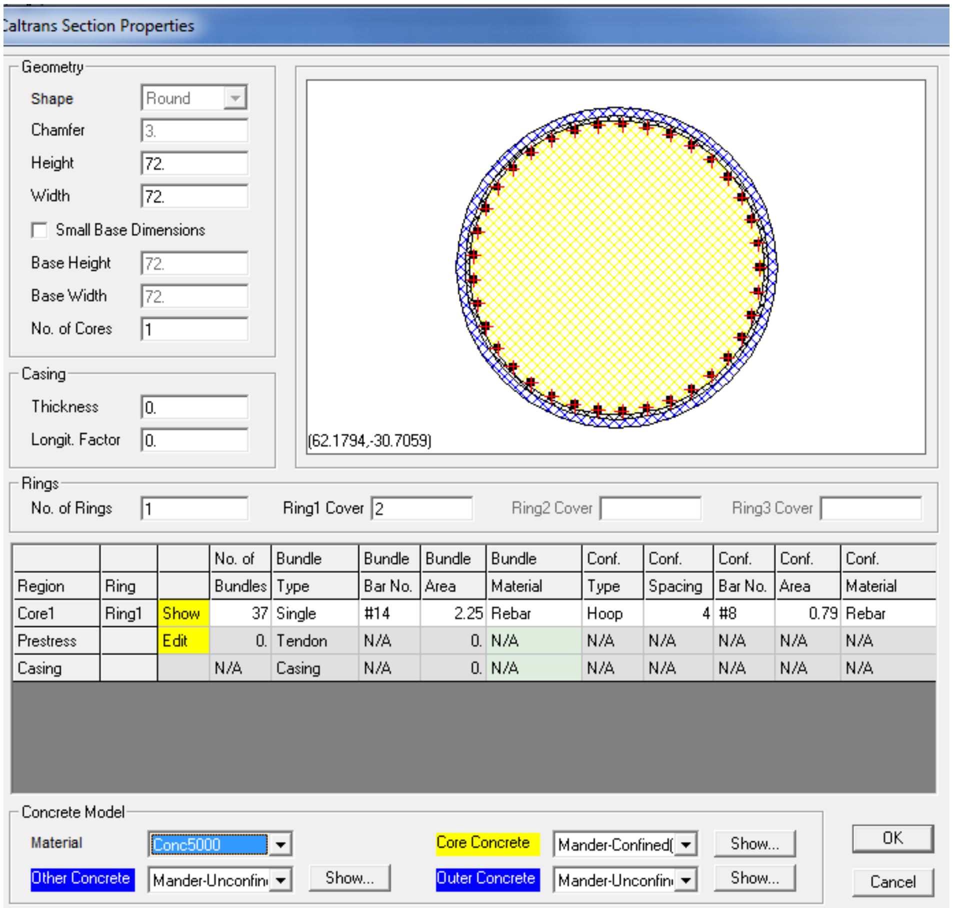

Figure 1.3-2
Section Properties – Conejo Crossover Structure 6-Foot Diameter Column

Due to the number of columns, pushover analysis proved to be difficult, as the software struggled to record the exact yield and collapse states for each and every column. Columns are seen to yield at different pushover steps. In displacement ductility demand check, the pushover step that presents the first column yield is taken as the reference and only those columns that yield during this step are reviewed for displacement ductility. In the case of the ductility capacity check, this was not an issue as only a local model of a single column was required. It has been demonstrated from the analysis and calculations that the Conejo Crossover Structure is structurally viable and meets the requirements of the CSDC. See Tables 2.3-9 to 2.3-10 for a summary of the results.

Table 1.3-12
Seismic Displacement Check – Displacement Demand Ductility Check

	Displacement Ductility Upper Limit	MCE Displacement ΔD (in)	Yield Displacement ΔY (in)	Displacement Ductility, μD
Longitudinal	5	0.340	1.357	0.251
Transverse	5	1.011	1.713	0.590

Table 1.3-13
Seismic Displacement Check – Capacity Ductility Check

	Capacity Ductility Lower Limit	Yield Column Displacement $\Delta YCOL$ (in)	Collapse Column Displacement $\Delta cCOL$ (in)	Capacity Ductility, μC
Longitudinal	3	0.102	0.642	6.27
Transverse	3	0.099	0.642	6.48

Table 1.3-14
Seismic Displacement Check – Displacement Demand/Capacity Ratio Check

	MCE Displacement Demand ΔD (in)	Displacement Capacity Δc (in)	Demand/Capacity
Longitudinal	0.340	1.999	0.17
Transverse	1.011	2.355	0.43

Table 1.3-15
Column Strength Check

	Envelope
Plastic Moment, Mp (kip-in)	182,261
Overstrength Moment, Mo (k-in)	218,713
Overstrength Shear Demand, V (kips)	1,037
Shear Capacity ØVn (kips)	2,280

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1.3.5.2 Foundations

The demand forces to be used for the foundation design are specified in the CSDC and include the service level moments, shears, axial loads and the moment demand induced by the column plastic hinging mechanism. The moment derived from the plastic hinging mechanism is taken as the plastic moment of the column, multiplied by an overstrength factor of 1.2 to give the overstrength moment demand. The adoption of the overstrength factor is based upon the seismic design philosophy whereby the columns will always yield at the MCE event to protect the pile. The factor is required to account for risk that the column may develop a greater plastic moment capacity than the idealized values used in the design. An axial-moment diagram from the section designer module in CSiBridge was used to check the reinforcement design of the pile. A minimal reinforcement ratio of 1% and #8 at 4-inch tie spacing was used for 9-ft diameter pile. Pile shear and moment demand derived from column overstrength moment are checked against capacity.

See Table 1.3-16 for a summary of the results.

Table 1.3-16
Pile Strength Check – Column Overstrength Demand per Monopile

	Max Axial	Min Axial
Extreme 3 Axial Demand	1,037	-935
Overstrength Design Shear Demand (k)	1,738	1,376
Shear Capacity (k)	4,719	4,719
Shear Demand / Capacity	0.37	0.30
Design Moment Demand per pile (k-in)	191,146	151,320
Moment Capacity per pile	309,907	245,915
Moment Demand / Capacity	0.617	0.615

1.4 Limits of Standard Bridge Design and Special Bridge Design

The boundary spans have the standard span length and cross section and are considered as standard structures. Therefore, the standard bridge design is suitable for the 14 spans before Conejo elevated slab structure for 18 spans after.

1.5 Construction Methods Assessment

The assumed method and sequence of construction for the crossover structure is to construct the CIDH shafts alongside the BNSF right-of-way line. These piles will be extended as columns in a second stage concrete pour. Subsequently it is assumed that the lower part of the column cap beam will be formed and cast on falsework to provide a temporary seat onto which the precast beams can be placed.

Each beam will have a lift weight of approximately 60 to 70 tons and the erection lift radius is likely to be approximately 100 to 130 feet.

It is assumed that beams will be lifted from the east side of the structure straight from the delivery truck using a mobile crane. It is expected that as beam placement is a relatively quick operation, this can be done between trains running on the BNSF, though the BNSF should be consulted to confirm the acceptability of this approach. Some beams adjacent to expansion joints may require additional concrete for the joints to be cast onto them as a second stage pour prior to erection.

Once a section of beams between expansion joints is placed, the deck slab in that area can be cast to produce the final slab structure. Stay in place forms soffit forms will be required between beams per BNSF guidelines. The deck pour is also assumed to include the upper half of the column capping beam which allows the beams and deck to act monolithically with the column cap and columns.

The constraints specific to the crossover structure suggest that a particular method of erection is most likely to be used by contractors. This does not rule out other methods of construction. It is likely that contractors will prefer to use methods that they have used successfully in the past. The assessment described here represents a subset of methods that could be used.

1.6 Temporary Construction Loadings Considered

No specific loadings have been considered for the temporary stages described.

1.7 Temporary Construction Easements

A general temporary construction easement of 100 feet width has been identified on one side of the crossover structure with a 10-foot width on the other side. These TCEs extend for the full length of the crossover structure. The side of the structure that has the 100-foot width was chosen as the side that appears to have easiest connection to the local roadway network. It is expected that a 100-foot TCE will be sufficient to accommodate the access and crane requirements for beam placement.

Provision has been made for temporary construction easements of 15 feet width to both sides of the proposed HSR right-of-way boundary where the standard viaduct is used.

1.8 Geotechnical Parameters Used for Design

The geotechnical parameters used for design are the same as described in the Geotechnical Design Report attached at Appendix A for CP4.

This design memorandum is based on information gathered from historic Caltrans borehole data from the vicinity of the CHSTP route and can, therefore, be applied to the design of Fresno to Bakersfield nonstandard and complex structures. The interpretation of the information gathered has been summarized to provide conservative lower-bound properties for the analysis of the structures.

Appendix C

Conejo Crossover Structure Calculations

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1.0 Introduction

Conejo Crossover Structure Report attached in Appendix B includes a project overview, description of the structure, analysis methodology, and analysis results for the worst case live load train configuration for the structure. This calculations report is intended to support the summary of analysis results presented in Appendix B.

While a summary of the worst case load combinations were reported in the Appendix B for brevity, analysis results for each load case along with complete calculations in compliance with the TM's are compiled in this appendix for completeness.

Compiled calculations for Conejo Crossover Structure are found in Section 5.0 of this appendix. Descriptions of attached calculations are presented in Section 2.0 to aid the reader in navigating the calculation spreadsheet format. General calculations and model definitions that apply to all structures analyzed are presented in Sections 3.0 and 4.0.

1.1 General Analysis

Calculations were performed to check the track serviceability and rail/structure interaction, as well as the strength design and seismic displacement requirements for the superstructure, bent, and foundation elements for each structure. Checks followed guidance from the California High-Speed Rail Authority's (Authority) Seismic Design Criteria, Track-Structure Interaction Criteria, and other applicable technical memoranda.

Several different models were required in order to represent the different conditions of the structure at different loading cases and for different design checks per TM 2.10.4 and 2.10.10. Linear and nonlinear springs were used to represent boundary conditions and stiffness in the model. Per TM 2.10.10, upper and lower bound stiffness were taken into account. Upper and lower bound mass were also accounted for. Figure 1.1-1 demonstrates an example of required analytical models created to check the track serviceability, rail/structure interaction, strength design and seismic displacement requirements for each structure. Each green box in the figure represents a unique model created for analysis to check the limit criteria required by the TMs, which are represented by pink boxes in the figure. Note that for Conejo Crossover Structure, there are up to two tracks loaded at the same time. The number of models varies for each structure depending on how many live load train positions were selected to analyze to capture the worst case scenario for the structure. Each train configuration required a new set of models to properly assign non-linear rail clips with the stiffness of one that is loaded by a train or in an unloaded state. TM 2.10.10 defines Condition 1 (CON1) as "a lower bound estimate of stiffness and upper bound estimate of mass" and Condition 2 (CON2) as "an upper bound estimate of stiffness and lower bound estimate of mass".

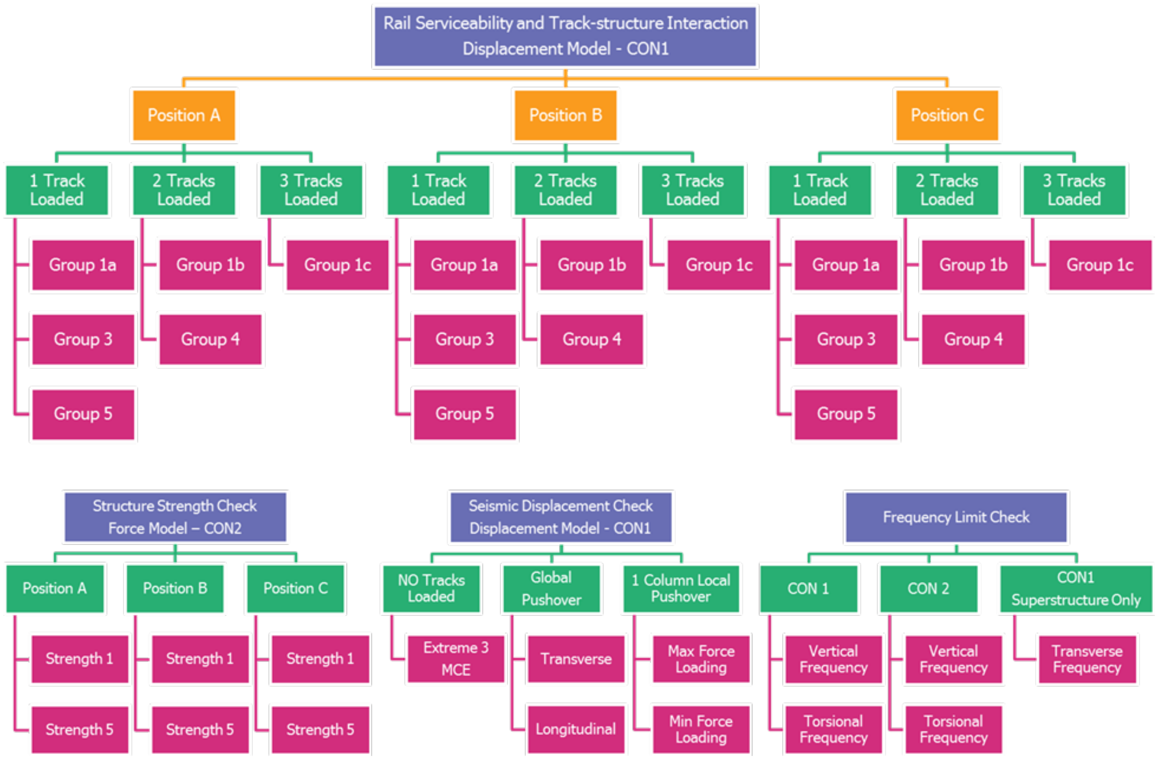

Figure 1.1-1
Analysis Model Flow Charts*

*Chart is generic. Not all cases apply to Conejo Crossover Structure.

2.0 Analysis Model Properties

Conejo Crossover Structure was primarily analyzed using SAP2000 Version 15.1 (SAP). Local models were created in SAP2000 Version 15.2.1 to perform local column pushover analysis per CSDC and check column and pile capacity. Similar materials and boundary conditions were defined in each model and are summarized in this section.

2.1 Model Properties

For frequency checks, the models used (1) upper bound stiffness and lower bound mass or (2) lower bound stiffness and upper bound mass properties to envelope the results. For track serviceability and rail-structure interaction checks, the models used lower bound stiffness and upper bound mass for conservativeness. The bent strength checks used models with an upper bound stiffness and nominal mass to find the upper bound force demand. Bent deflection checks used models with a lower bound stiffness and upper bound mass to find the greatest deflection. All models used bents with 5,000 psi concrete column strength. In some of the models, where upper bound stiffness was used, the increase in stiffness was incorporated in the moment of inertia modifier rather than adjusting the 5,000 psi strength concrete's modulus of elasticity. A 1.3 factor increase in concrete strength is equivalent to a 1.14 (the square root of 1.3) factor increase in the modulus of elasticity. Since bent stiffness is a factor of both the modulus of elasticity and moment of inertia, the 1.14 factor was incorporated in the moment of inertia factor for simplicity.

Bent effective moment of inertia, concrete modulus of elasticity, dead load mass percentage and the analysis type used for each check are shown in Table 2.1-1. Depending on analysis software nonlinear capabilities, particular analysis types were selected to comply with both TM 2.10.10 and TM 2.4.2.

Table 2.1-1
Model Properties for Stiffness, Mass, and Analysis Type

Model Title	Check	Description	Column Stiffness	Column Concrete Strength (psi)	Equivalent Column Concrete Modulus of Elasticity (psi)	Dead Load Mass (%)	SAP/ CSiBridge Analysis Type	Midas Analysis Type
FREQ CON 1	Modal Frequency	Lower Bound Stiffness, Upper Bound Mass	0.3 x I_g	5000	4,503,000	105%	Modal	Modal
FREQ CON 2	Modal Frequency	Lower Bound Stiffness, Upper Bound Mass	I_g	5000	5,134,000	95%	Modal	Modal
DISP "X"	Track Serviceability and Rail Structure Interaction at Train Position "X"	Lower Bound Stiffness, Upper Bound Mass	0.3 x I_g	5000	4,503,000	105%	Linear Static; Nonlinear Modal Time History	Nonlinear Static Time History; Linear Response Spectrum
FORCE	Component	Upper Bound	I_g	5000	5,134,000	100%	Linear	Nonlinear

Model Title	Check	Description	Column Stiffness	Column Concrete Strength (psi)	Equivalent Column Concrete Modulus of Elasticity (psi)	Dead Load Mass (%)	SAP/ CSiBridge Analysis Type	Midas Analysis Type
"X"	Strength at Train Position "X"	Stiffness, Nominal Mass					Static; Nonlinear Modal Time History	Static Time History; Nonlinear Response Spectrum
PO (SOFT)	Seismic Deflection at MCE (Global)	Lower Bound Stiffness, Nominal Mass	0.3 x I_g	5000	4,503,000	100%	Nonlinear Modal Time History	Nonlinear Response Spectrum
PO (STIFF)	Seismic Deflection at Pushover (Global)	Upper Bound Stiffness, Nominal Mass	I_g	5000	5,134,000	100%	Nonlinear Pushover	-

2.2 Material Properties

Linear material properties were used to model track serviceability, rail/structure interaction, and strength design. However, nonlinear material geometry, rail clip links and foundation springs were used to capture nonlinear behavior during these analyses. Table 2.3-1 defines the linear materials used for all models. Increased mass or expected material properties were applied in models where upper or lower bound stiffness or mass was required. Concrete with strength of 5000psi and 6000psi were used for the substructure and superstructure, respectively.

Table 2.2-1
Material Properties

Material Name	Unit Weight (Kip/in3)	Unit Mass (Kip-s2/in4)	Elasticity (Kip/in2)	Shear Modulus (Kip/in2)	Poisson	Thermal (1/F)
A992Fy50	0.000284	7.34E-07	29000	11153.85	0.3	6.5E-06
Rebar	0.000284	7.34E-07	29000	0	0	6.5E-06
Rail Steel	0	0	29000	11153.85	0.3	6.5E-06
Conc5000	8.97E-05	2.32E-07	4503	1876.25	0.2	6.0E-06
Conc5000 High Mass	9.43E-05	2.44E-07	4503	1876.25	0.2	6.0E-06
Conc5000EXP	8.97E-05	2.32E-07	5134	2139.167	0.2	6.0E-06
Conc5000EXP Low Mass	8.51E-05	2.2E-07	5134	2139.167	0.2	6.0E-06
Conc6000	8.97E-05	2.32E-07	4933	2055.417	0.2	6.0E-06
Conc6000 High Mass	9.43E-05	2.44E-07	4933	2055.417	0.2	6.0E-06

Material Name	Unit Weight (Kip/in3)	Unit Mass (Kip-s2/in4)	Elasticity (Kip/in2)	Shear Modulus (Kip/in2)	Poisson	Thermal (1/F)
Conc6000EXP	8.97E-05	2.32E-07	5624	2343.333	0.2	6.0E-06
Conc6000EXP Low Mass	8.51E-05	2.2E-07	5624	2343.333	0.2	6.0E-06

Nonlinear materials were applied at columns to model plastic hinging during nonlinear pushover analysis. Stress-strain constitutive models for nonlinear confined and unconfined concrete, as well as nonlinear steel material used for reinforcement, are defined in Figures 2.2-1 to 2.2-3.

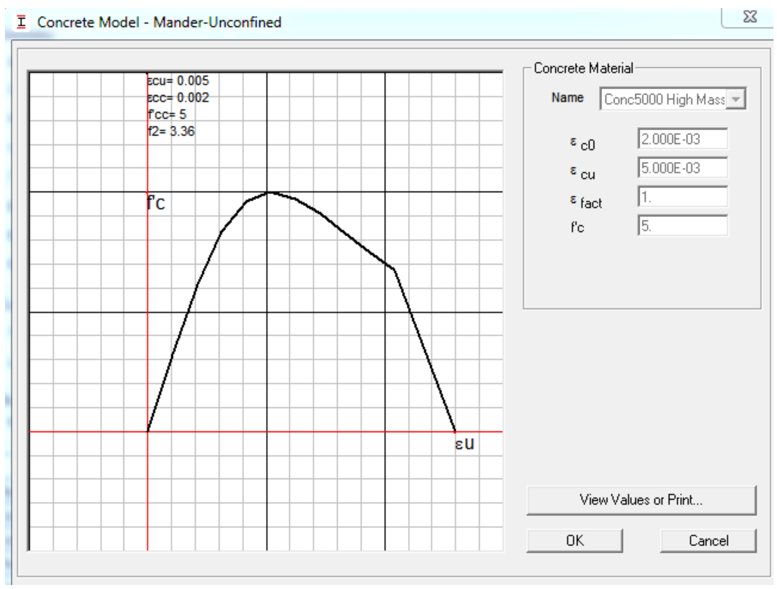

Figure 2.2-1
Unconfined Concrete Stress-strain Curve

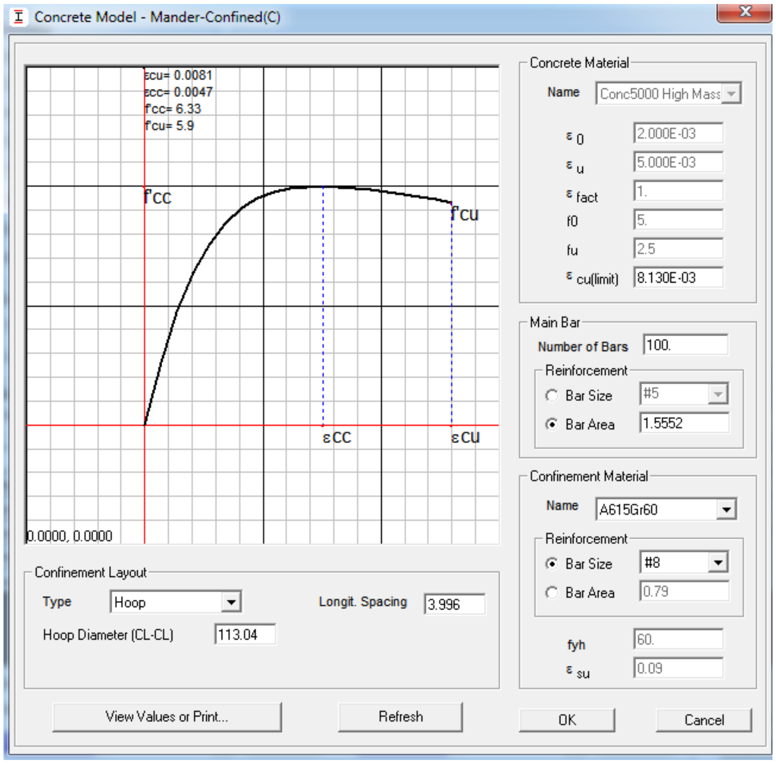

Figure 2.2-2
Confined Concrete Stress-strain Curve

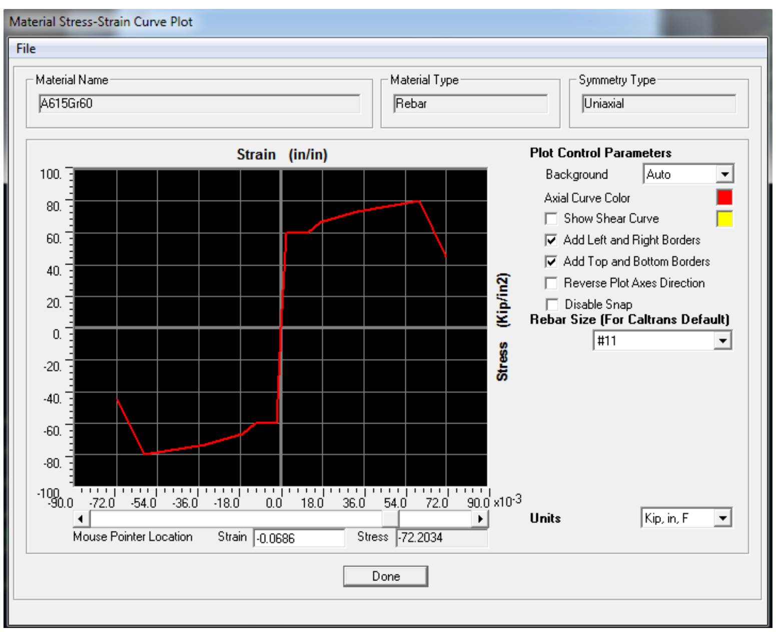

Figure 2.2-3
SAP Defined Caltrans Reinforcing Steel Stress Strain Curve

2.3 Rail Properties

The two rails of each track were modeled as a single member. The section properties of 141RE AREMA rails were used. Rails were connected to the structure via rail clip springs, as described in TM 2.10.10 Section 6.13.6. Clips occurred at 27 inches on center, and the nonlinear longitudinal stiffness differed for a loaded and unloaded case. For the frequency checks, all rails were considered unloaded. A nonlinear longitudinal spring with kinematic hysteretic properties and a yield point occurring at .02 inches was used. Vertical and transverse stiffness were linear.

Table 2.3-1
Rail Section Properties

Section Name	Description	Area (in^2)	J (in^4)	I_{major} (in^4)	I_{minor} (in^4)
141RE Rail	Typical rail section (2 rails)	27.6	10	201	22,070

Table 2.3-2
SAP Rail Clip Spring Properties

Spring (Link) Name in SAP	Description	Vertical Axis Stiffness (Linear) (k/in)	Longitude. Axis Initial Stiffness (Nonlinear) (k/in)	Transv. Axis Stiffness (Linear) (k/in)	Rotation Around Vertical Axis Boundary Condition	Rotation Around Longitude Axis Boundary Condition	Rotation Around Trans. Axis Boundary Condition
Loaded Clip 27in	Rail Clip at 27" OC, Train Loading	750	270	84.375	Free	Fixed	Fixed
Unloade d Clip 27in	Rail Clip at 27" OC, No Train Loading	750	135	84.375	Free	Fixed	Fixed
Unloade d Clip Boundar y	Rail Clip at Model Boundary for Rail Past Model Extent	2016	Free	Free	Free	Free	Free

2.4 Train Loading

Train mass was included in the models for strength, deflection, track serviceability and rail-structure interaction checks. A train mass equivalent to 6.375 klf was applied for a single train at 8 feet above the track, the center height of the train, and corresponded to the live load position of the train on Track 2.

Train live load was applied to the model in different locations to check displacements and forces at various train positions. These positions were chosen to produce maximum demand on the rail and substructure. The load positions for Conejo Crossover structure are denoted in Section 4.0 of this Appendix. Train live load position names are identified by the primary column or bent for

which the maximum displacement or force is induced. Therefore the reported train positions are B11, B32 and B42 for Bents 11, 32, and 42, respectively.

Trains were assumed to be 1,000 feet long. The vertical live load was simplified to a uniform 6.375 klf live load on both tracks. Per TM 2.10.10, an impact load increase of between 20% and 22%.5 was applied for track serviceability and rail-structure interaction checks, depending on the location of the load. An average impact factor of 21.5% was taken for most train positions. A horizontal 1.35 klf braking force over 1,000 feet was applied to Track 2 and a horizontal 2.25 klf traction force over the 100 feet nearest to the governing joint on Track 1 were also applied for these checks. See Figure 2.4-1 for a graphical diagram of train loading.

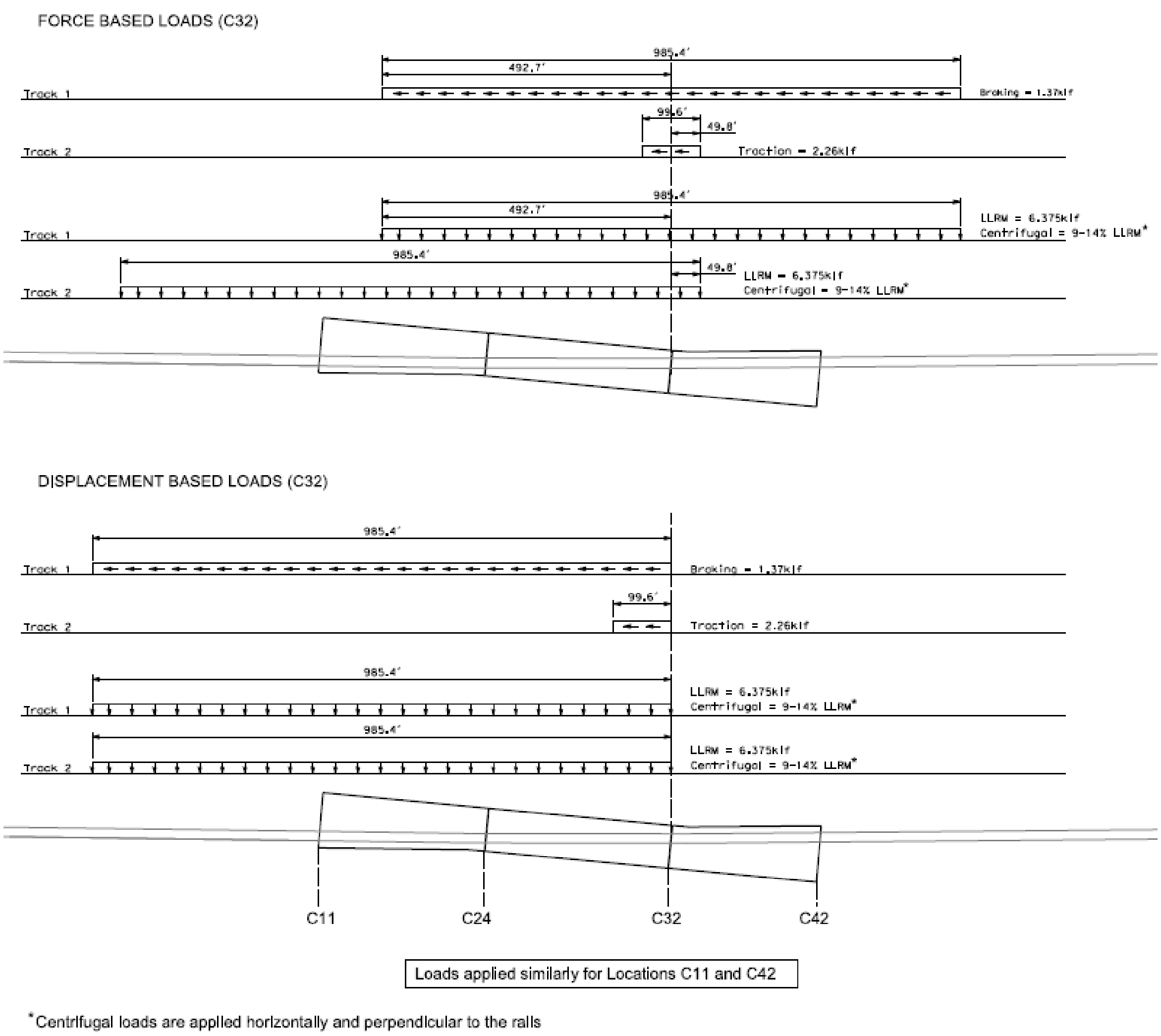

Figure 2.4-1
Train Loading Configuration (Example Bent 32)

3.0 Model Calculation Types

The calculations in Section 4.0 of this Appendix include any additional model criteria needed to understand the analysis performed in the design check of the Conejo Crossover Structure if not already discussed in Appendix B. In addition, train loading positions diagrams, assigned cross-sections and any other images that may be needed to interpret the calculations are included in Section 4.0 of this Appendix. In some instances, tables are provided summarizing the response of the structure at each live load scenario.

This section provides a brief description of attached calculations along with supplemental assumptions or additional information needed to interpret the results.

3.1 Frequency Calculations

Per TM 2.10.10, the vertical, torsional and transverse frequencies of the structure must meet criteria to ensure serviceability of the train. Lower bound vertical and torsional frequencies were checked using a Condition #1 model with upper bound mass and lower bound stiffness. Upper bound vertical and torsional frequencies were checked using a Condition #2 model with lower bound mass and upper bound stiffness. No train live load was applied in these models and all rail clips were defined as “unloaded”. Transverse frequency was checked using a Condition #1 model which included only the flexibility of the superstructure per TM 2.10.10.

3.2 Displacement Calculations

3.2.1 Track Serviceability Check

Per TM2.10.10, girder deformations were checked for track serviceability with that corresponds to different live load positions. Water loads were ignored for this design stage. Groups 1a, 1b, and 3 were checked for all structures. Group 2 was only checked when centrifugal force was considered. Displacement was considered for live load only and did not included deflection due to dead load or self-weight. Deck twist was checked by measuring the deformation of “dummy links” along 10 foot lengths of the rails for structures analyzed in SAP. Deformations were found to be within rail serviceability limits for all structures.

3.2.2 Rail-Structure Interaction Check

Per TM2.10.10, rail deflection and stresses were checked for rail-structure interaction. Group 4 and Group 5 load cases were checked for both positive and negative temperature increase of 40 degrees applied to the superstructure concrete. Nonlinear Static Analysis was used to check non-seismic loads. Results from Group 5 nonlinear static loads were superimposed with the maximum results from the Response Spectrum Seismic Analysis.

3.3 Force Calculations

Per TM 2.3.2, Strength 1 combination and Strength 5 combinations for both earthquake directions were considered. Flexural and axial capacities are interactive and individual load outputs for each column case were analyzed. The shear demand in each direction was enveloped to find the total shear demand. The V2 and V3 nomenclature in the results indicate axes in the longitudinal and transverse directions, respectively. The M2 and M3 nomenclature indicate the rotational axes in the corresponding direction. The moment and shear demands of the column were added together using the Square Root Sum of Squares (SRSS) method in order to compare to the moment and shear capacity in a single direction. Initial design of column reinforcement begins with preliminary sizing calculations based on Caltrans Seismic Design Criteria (CSDC) reinforcement requirements.

3.3.1 Column Strength Calculations

Two types of calculations are considered for column strength calculations:

- Column strength design calculations. Worst load case/column is found using SAP Section Check PMM Ratio. These calculations are used primarily for shear check.

- Output of column forces checked against section capacity. Section capacity envelope determined using CSiBridge Section Designer (same as SAP but to AASHTO rather than ACI standards). The CSiBridge capacity envelope has been copied into the worksheet and a calculation undertaken to interpolate the capacity to the axial load, P (see comment in work-sheet). A macro is used to run this calculation for each frame, as axial loads vary. These calculations are used primarily for moment check.

3.3.2 Column Capacity Plot

As capacity is dependent on axial load, a calculation is undertaken (rows hidden in spreadsheet calculation) to interpolate the Moment capacity based upon the input axial load. Loads are taken from worst case/column as identified in SAP Section Designer and the section capacity envelope is copied from SAP or CSiBridge Section Designer.

3.3.3 Pile Strength Calculations

Design loads are based upon the overstrength moments and shear from column, looking at the adjacent non-standard pile group only. These are calculated in the "Pile Capacity" sheet and referenced in. In the case when the moment is applied towards/away from the crossover, it is thought that much of the moment will be taken by push-pull from the piles and so will not govern moments. Negative effects from push pull are considered in the axial load. Calculating what the 'pull' tension would be in the pile if the moment/shear is applied longitudinally (see "Pile Capacity" sheet) should envelope all worst cases (highest moment, lowest axial load).

3.3.4 Pile Capacity Output

Applied loads are calculated similarly to column capacity calculations described in Section 3.3.2 of this appendix. Output of column frame loads are checked to ensure there are no tension forces in the columns that should be considered in the pile design.

3.3.5 Dowel Strength Calculations

Demand output from dowel elements between thermal spans for crossover structures are checked for adequacy using AASHTO design criteria.

3.4 Pushover Calculations

Per TM 2.10.4, Conejo crossover structure is considered important, primary, and complex. Seismic displacements, ΔD, with MCE level seismic forces were checked with Response Spectrum Analyses. The displacement demands were compared to the resulting deflections in the pushover model. Column displacements at yield, ΔY, and collapse, ΔC, were determined with local Nonlinear Pushover Analyses in SAP where a single column was loaded with worst case axial and moment demand from MCE model. All structures performed at a No Collapse Level during an MCE strength earthquake and performed at an Operability Performance Level during an OBE strength earthquake. Initial pushover calculations begin with SAP/CSiBridge Section Designer output, or Xtract for column cross-sections to calculate the height of the idealized Caltrans plastic hinge per CSDC.

3.4.1 MCE Displacement

MCE displacement demand, reported in inches, is measured at the top of each column due to Extreme 3 Load Combination. The raw table output from the seismic analysis model is summarized in a pivot table to output the maximum displacement demand for use in Displacement Demand Ductility Check of the columns.

3.4.2 Displacement Ductility Demand

To calculate the displacement ductility demand, nodes at the tops of columns that yield first under global pushover analysis are reported at the step number shown. These nodal displacements are then compared with the displacements observed under MCE conditions to check that each column achieves a displacement ductility demand of less than required limit per CSDC.

3.4.3 Local Member Ductility Capacity

Pushover analysis is run on a single column with an envelope of representative load loading permutations. The local pushover SAP model consists of a single fixed-fixed or fixed-roller column (depending on the column condition) that is pushed in both X and Y directions. The displacement that forms yielding and then collapse in the assigned plastic hinge is compared to ensure the capacity ductility is greater than three per CSDC.

3.4.4 Capacity Protection Check

Capacity protection calculations are performed to check that both the foundation and superstructure are capacity protected by exceeding the overstrength moment and corresponding shear demand from the column. Upper and lower case axial load conditions are considered. The column overstrength moment is calculated with expected material properties using SAP or CSiBridge Section Designer to generate the Caltrans Idealized Moment Curvature Curve. The pile and superstructure capacity are compared to the column overstrength demand.

4.0 Analysis Model Geometry

This section includes images of model geometry and element and node identification. This information is intended to assist in the understanding of Conejo Crossover structure calculation spreadsheets attached in Section 5.0 of this appendix.

4.1 Structure SAP Model

Structure model and assignment are shown in this section. Figure 4.1-2, Figure 4.1-3, Figure 2.4-1, Figure 4.1-4, and Figure 4.1-5 are representative model overview and definitions.

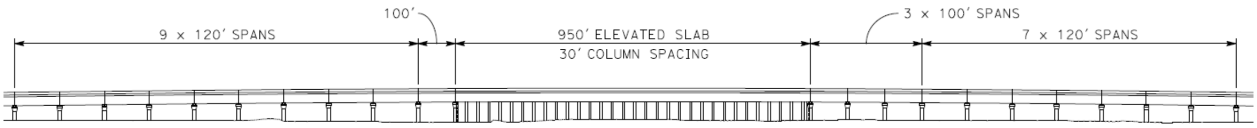

Figure 4.1-1
Conejo SAP Model - Elevation View

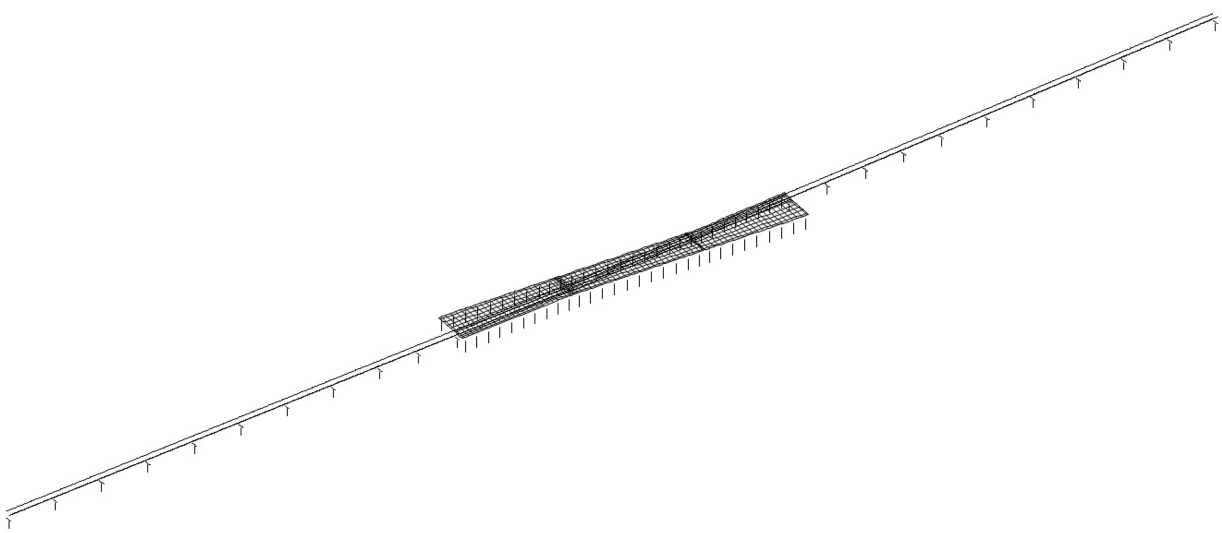

Figure 4.1-2
Conejo SAP2000 Model

The intermediate pier, truss members, rails and concrete girders were represented by stick elements. See Figure 4.1-3.

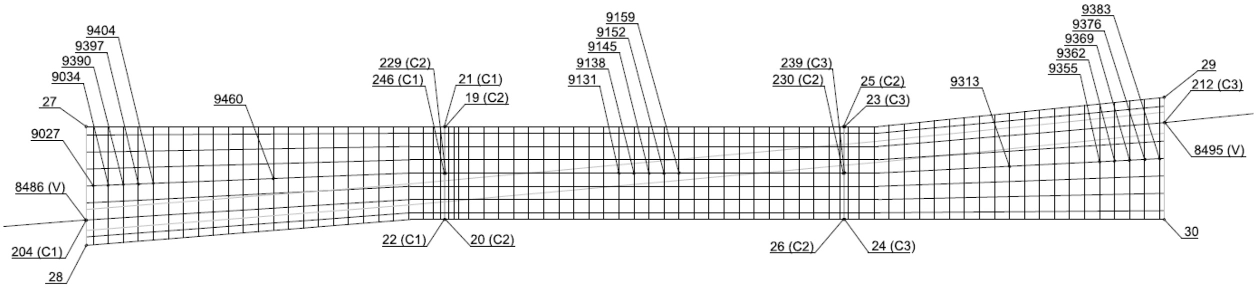

Figure 4.1-3
Conejo SAP Model - Node ID

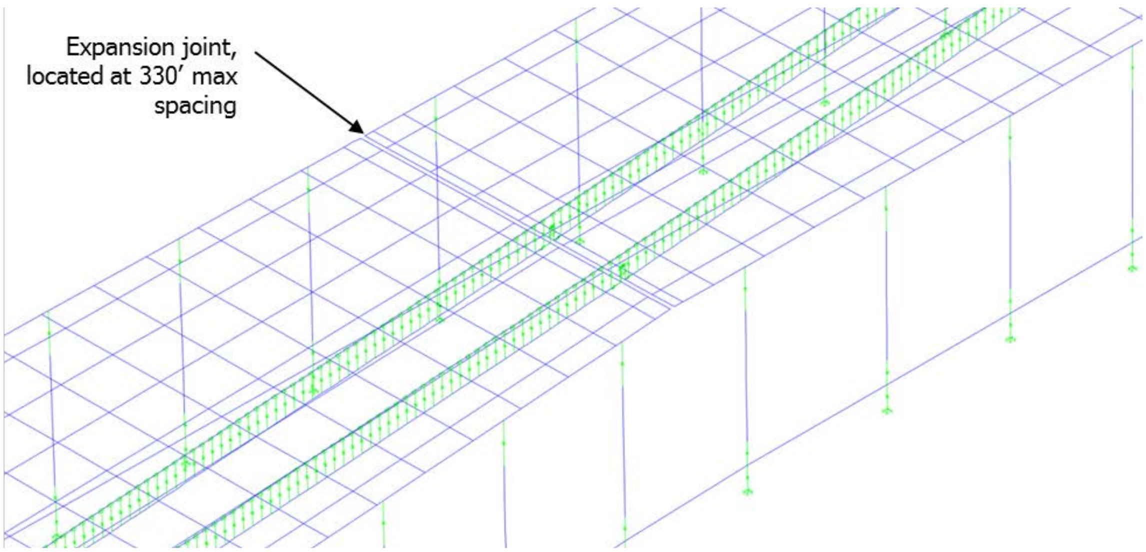

Figure 4.1-4
Model Definitions - SAP Model: 3D View Internal Joint

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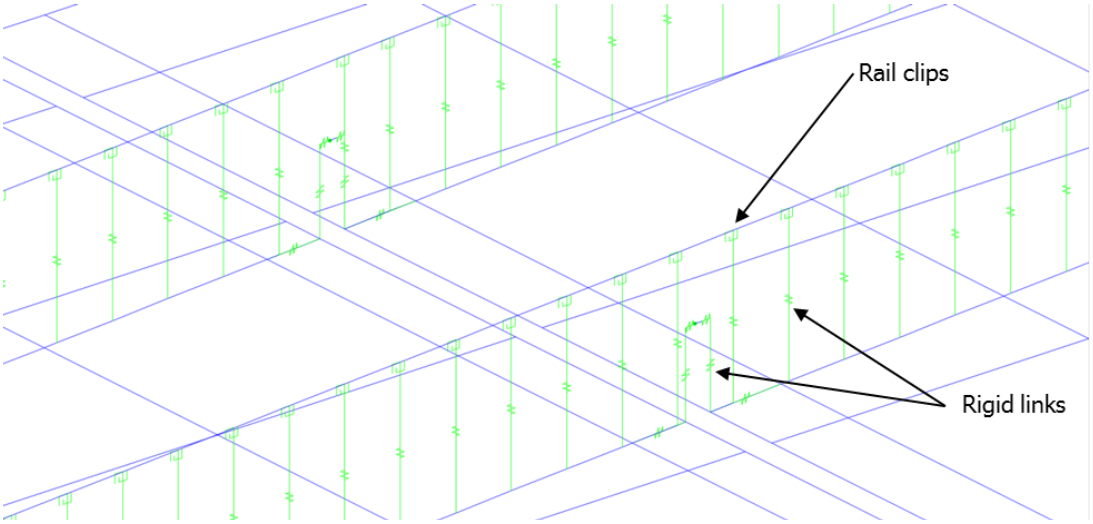

Figure 4.1-5
Model Definitions - SAP Model: Internal Joint Detail

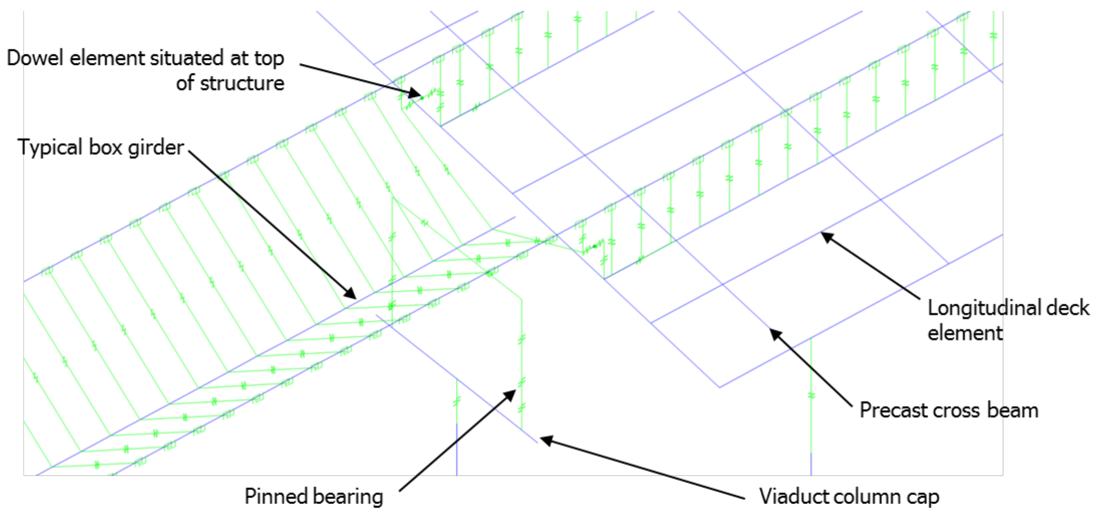

Figure 4.1-6
SAP Model: Transition Joint Detail

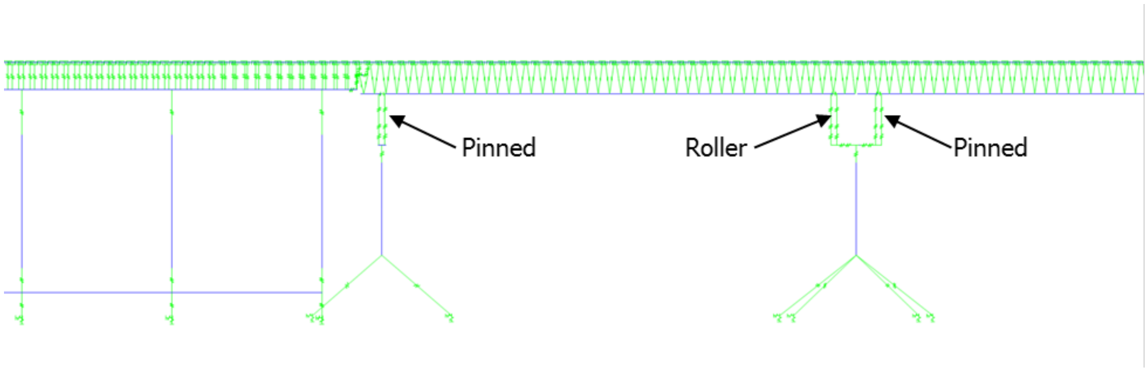

Figure 4.1-7
SAP Model: Viaduct Articulation

4.2 Model Section Properties

Section Properties are shown in Figure 4.2-1,Figure 4.2-2,Figure 4.2-3,Figure 4.2-4,Figure 4.2-5,Figure 4.2-6,Figure 4.2-7, and Figure 4.2-8.

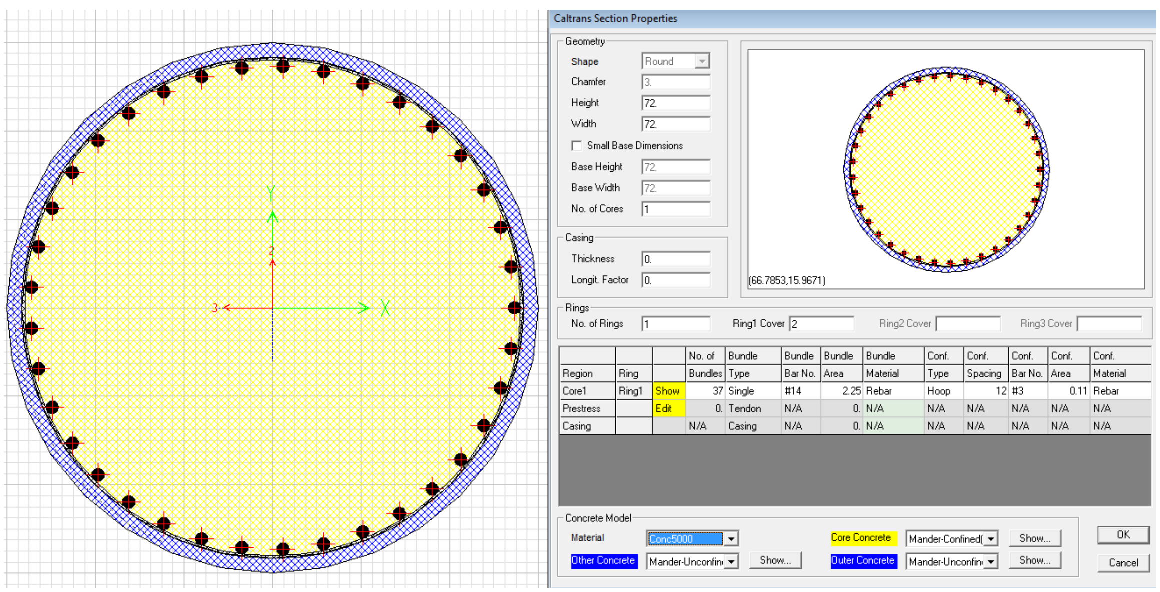

Figure 4.2-1
6-ft Crossover Column Section

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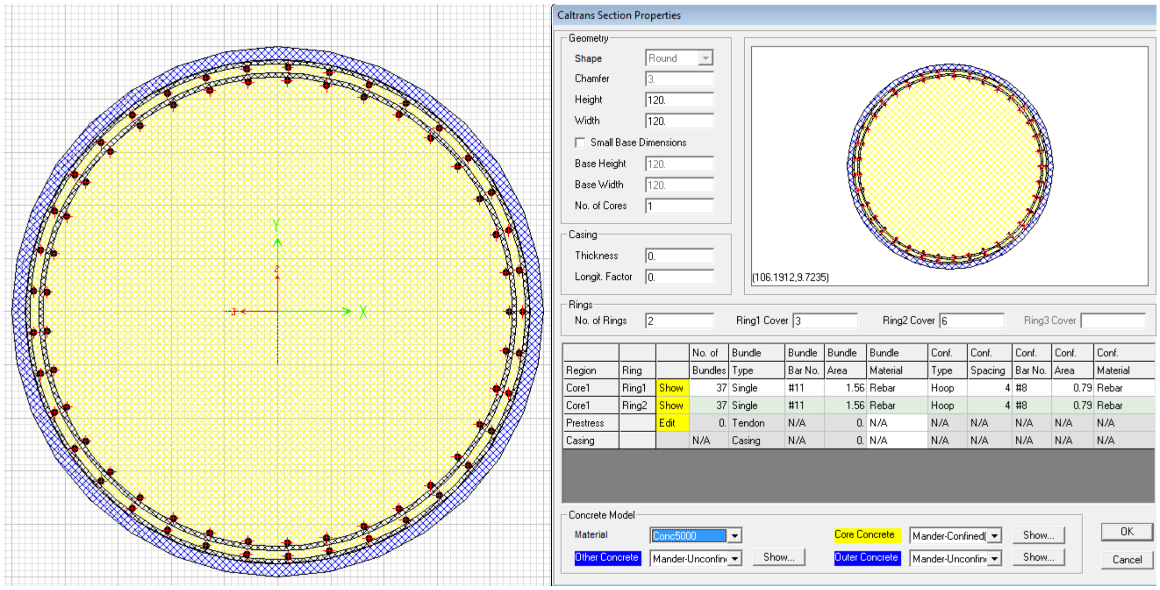

Figure 4.2-2
10-ft Viaduct Column Section

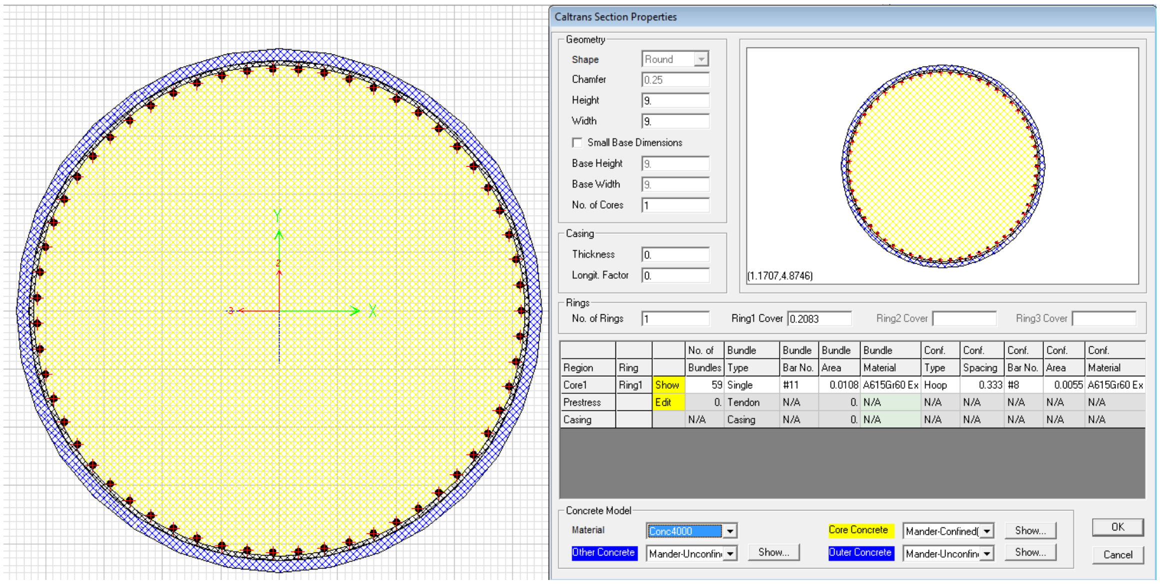

Figure 4.2-3
9-ft Pile Section

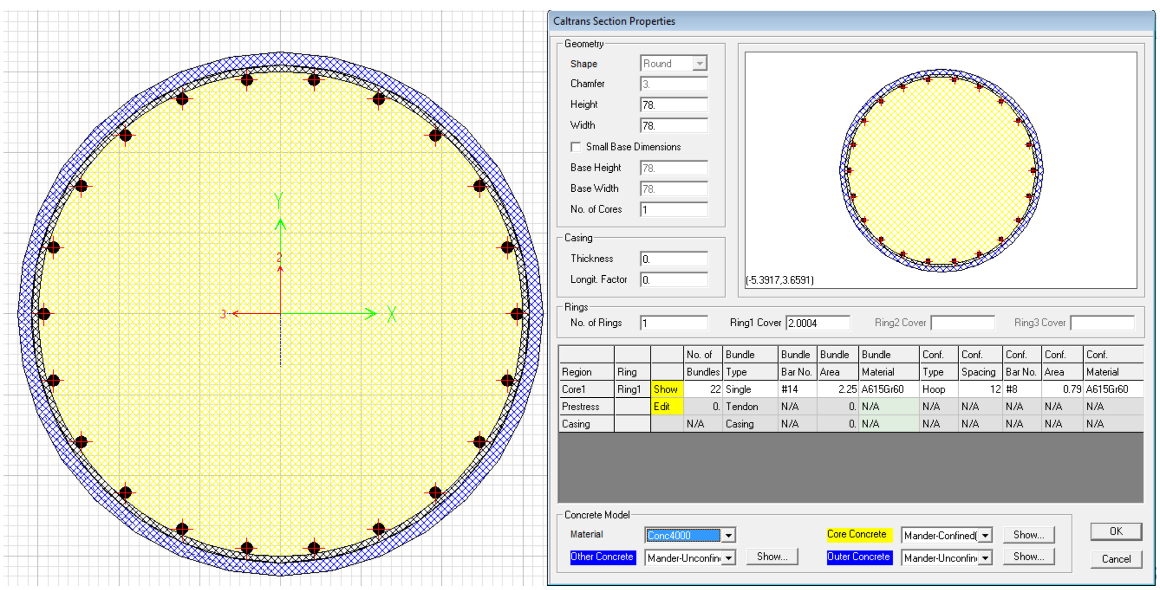

Figure 4.2-4
6.5ft Pile Section

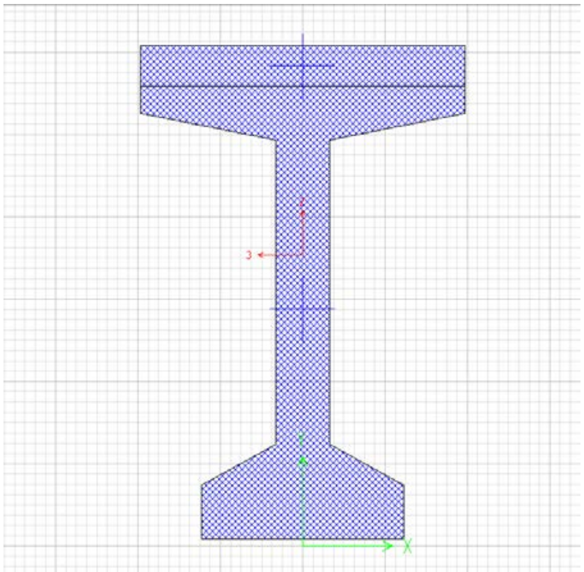

Figure 4.2-5
Crossover transverse beam

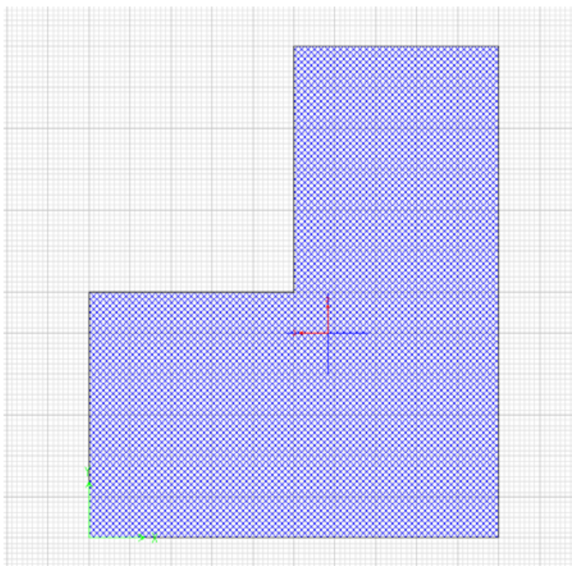

Figure 4.2-6
Crossover column cap

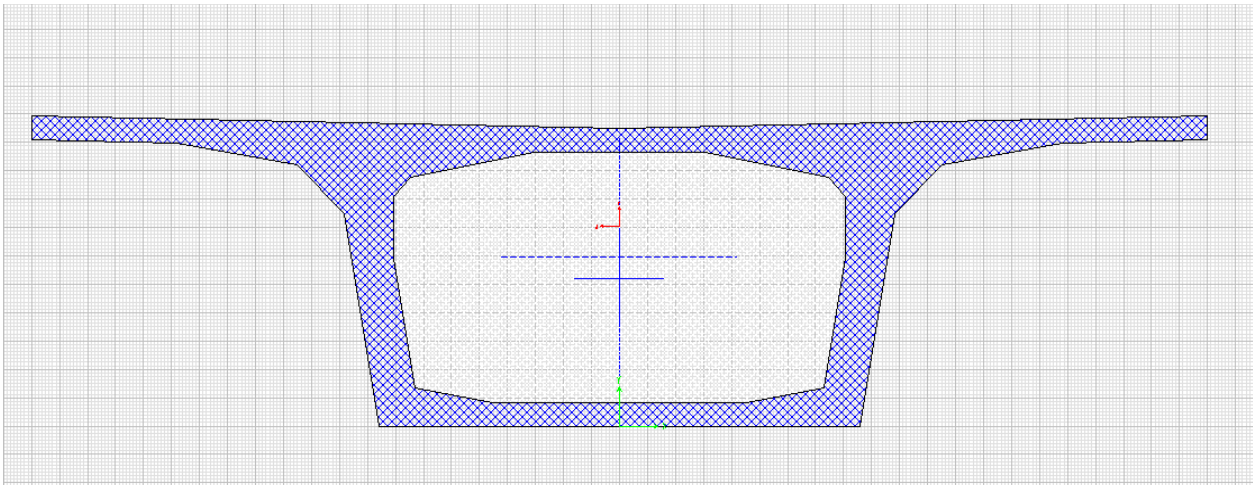

Figure 4.2-7
Typical Viaduct Girder

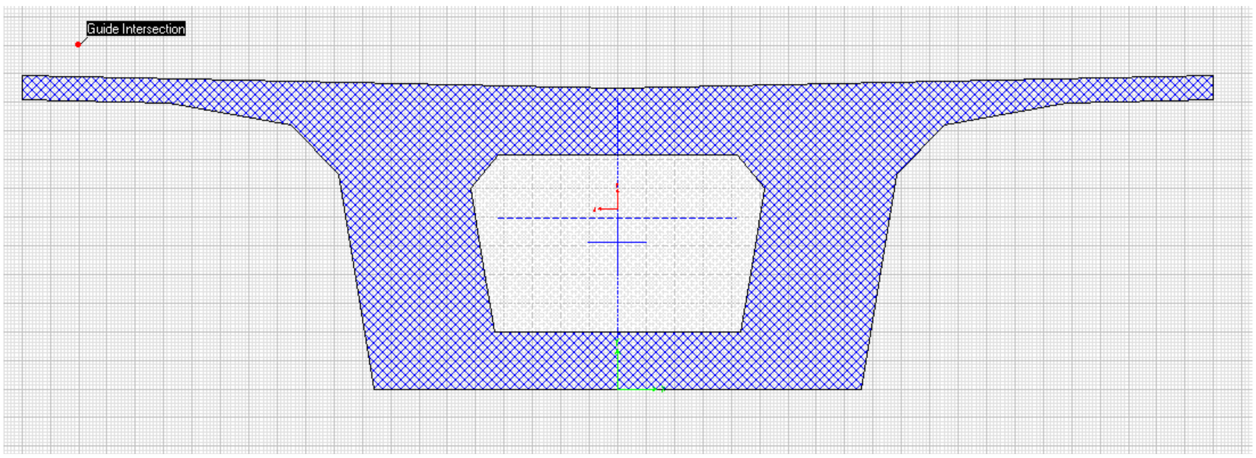

Figure 4.2-8
Typical Viaduct End Girder

5.0 Calculation Spreadsheet Attachments

This section contains prints of calculation spreadsheets which justify the design of Conejo Crossover Structure. The SAP model output reported in this section is based on the SAP model described in this appendix. For descriptions of calculation types, see section 3.0 of this report. For analysis methodology and a summary of results, see Appendix B.

SAP Model Input

Conejo Crossover

Column Heights

Viaduct 1			
Average Clear Height	23.5	ft	taken from CAD
Ground cover to soffit	2	ft	
Average column height	25.5	ft	
Cap thickness	7	ft	ignoring bearings
Average clear height	**18.5**	ft	
Conejo			
Average Clear Height to Soffit	24.5	ft	taken from CAD
Ground cover to P.cap	2	ft	
Average column height	**26.5**	ft	
Viaduct 2			
Average Clear Height	23.5	ft	taken from CAD
Ground cover to cap	2	ft	
Average column height	25.5	ft	
Cap thickness	7	ft	ignoring bearings
Average clear height	**18.5**	ft	

Viaduct Element Z

Depth of girder	10.5	ft
Centroid of viaduct	84.396	in above soffit
Centroid of element	**3.467**	ft below top of slab

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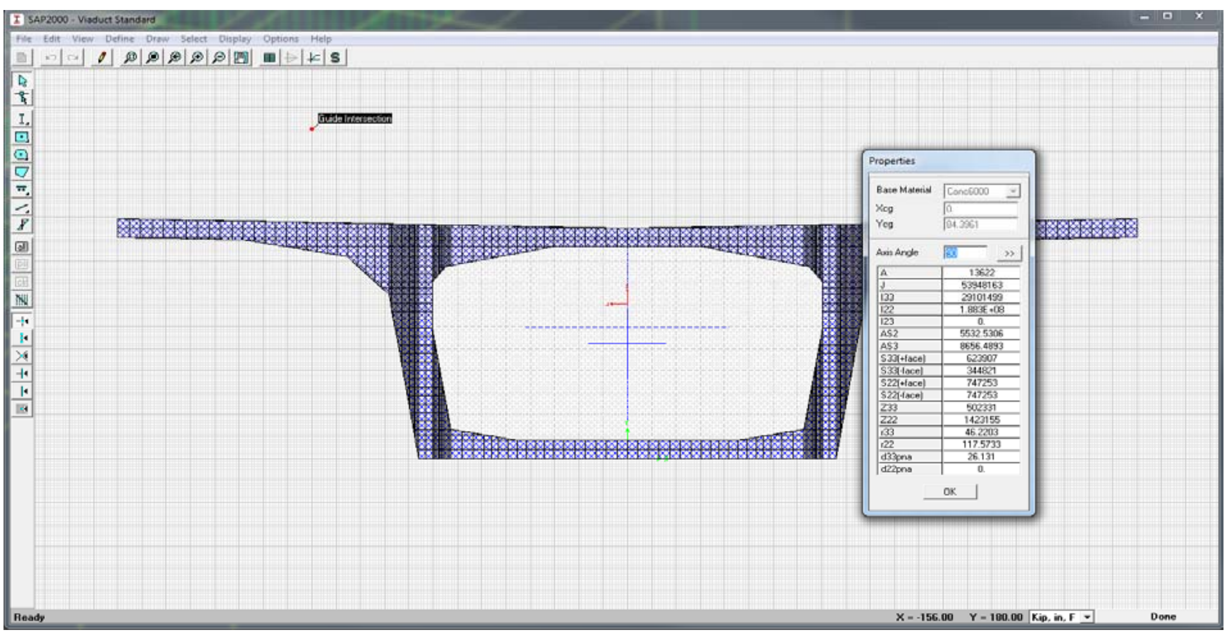
Longitudinal Deck Elements

TU 1		
End 1	94.5	ft
End 2	74.2	ft
Element Width 1a	**89.43**	ft
Element Width 1b	**79.28**	ft
TU2		
End 1	74.2	ft
End 2	74.2	ft
Element Width 2	**74.20**	ft
TU 3		
End 1	97.3	ft
End 2	74.2	ft
Element Width 3a	**91.53**	ft
Element Width 3b	**79.98**	ft

Clear Span Lengths

Column Cap Width	10	ft
TU1 Average Span	**84.35**	ft
TU2 Average Span	**74.20**	ft
TU3 Average Span	**85.75**	ft



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SAP Model Load Calculations

Conejo Crossover

LLRM

LLRM	6.4	klf	

Impact Factor

L,min	64.2	ft	taken conservatively as the lowest span
IM	28.08116	%	

Centrifugal Force

R	29000	
V	250	
f	1	conservative
C	14.39655	%
LLRM	6.4	klf
CF	0.92	klf
	0.076782	kli
Lever arm	8	ft
Moment	7.371034	k-ft/ft

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Track-Structure Interaction: Frequency Analysis
Conejo Crossover

Model for Condition 1	Conejo Frequency Con1.sdb
Model for Condition 2	Conejo Frequency Con2.sdb
Model for Transverse	Conejo Frequency Transverse.sdb

Check Vertical Frequency Limits: TM 2.10.10 Section 6.8.2

Thermal Unit 1

	Mode	Period (secs)	Frequency (Hz)
Condition 1	42	0.224	4.463
Condition 2	45	0.190	5.271

Frequency Limit		
Transverse Span	99.36	ft
Column Length	35.5	ft
Effective Span, L	73.82	ft
Lower bound	3.73	Hz
Upper bound	9.23	Hz

ok

Thermal Unit 2

	Mode	Period (secs)	Frequency (Hz)
Condition 1	64	0.179	5.583
Condition 2	67	0.155	6.452

Frequency Limit		
Transverse Span	74.2	ft
Column Length	35.5	ft
Effective Span, L	62.92	ft
Lower bound	4.10	Hz
Upper bound	10.40	Hz

ok

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Thermal Unit 3

	Mode	Period (secs)	Frequency (Hz)
Condition 1	43	0.223	4.489
Condition 2	46	0.189	5.294

Frequency Limit		
Transverse Span	100.36	ft
Column Length	35.5	ft
Effective Span, L	74.256	ft
Lower bound	3.72	Hz
Upper bound	9.19	Hz

ok

Check Torsional Frequency Limits: TM 2.10.10 Section 6.8.3

Thermal Unit 1

Frequency Limit		
Condition 1	5.36	Hz
Condition 2	6.33	Hz

No modes found for TU1 below 5.36Hz

ok

Thermal Unit 2

Frequency Limit		
Condition 1	6.70	Hz
Condition 2	7.74	Hz

No modes found for TU2 below 6.7Hz

ok

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Thermal Unit 3

Frequency Limit	
Condition 1	5.39
Condition 2	6.35

No modes found for TU3 below 5.39Hz

ok

Check Transverse Frequency Limits: TM 2.10.10 Section 6.8.4

	Mode	Period (secs)	Frequency (Hz)
Transverse Case	1	0.650	1.538

Frequency Limit		
Transverse Case	1.20	Hz

No modes found for TU1, TU2 or TU3 below 1.2Hz

ok

SAP 2000 Frequency Output

Condition 1
Stiffness: Lower Bound
Mass: Upper Bound

Model: Conejo Frequency Con1

TABLE: Modal Participating Mass Ratios

OutputCase	StepType	StepNum	Period	UX	UY	UZ	SumUX	SumUY	SumUZ	RX	RY	RZ	SumRX	SumRY	SumRZ
Text	Text	Unitless	Sec	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	1.024061	0.0025	0.2033	7.215E-07	0.0025	0.2033	7.215E-07	0.00004547	0.000002076	0.5976	4.55E-05	0.000002076	0.5976
MODAL	Mode	2	0.80301	0.0053	0.0109	5.063E-07	0.0078	0.2142	0.000001228	0.000002264	0.000008885	5.592E-09	4.77E-05	0.00001096	0.5976
MODAL	Mode	3	0.793829	0.0011	0.1397	0.000000333	0.0089	0.3539	0.000001561	0.00002883	9.555E-08	0.0774	7.66E-05	0.00001106	0.6749
MODAL	Mode	4	0.775607	0.2011	0.0003982	0.00002013	0.21	0.3543	0.00002169	0.0001354	0.0001364	0.0002384	0.000212	0.0001474	0.6751
MODAL	Mode	5	0.636974	0.00001389	0.0084	0.00000055	0.21	0.3627	0.00002224	8.123E-07	3.615E-07	0.0079	0.000213	0.0001478	0.683
MODAL	Mode	6	0.622348	0.0003321	0.0558	0.000001964	0.2103	0.4185	0.0000242	0.00001931	0.000001762	0.0889	0.000232	0.0001495	0.7719
MODAL	Mode	7	0.599953	0.2315	0.0001837	0.00009855	0.4419	0.4186	0.0001228	0.0003291	0.0003382	0.0012	0.000561	0.0004878	0.773
MODAL	Mode	8	0.59706	0.142	0.0004169	0.00002164	0.5839	0.4191	0.0001444	0.000001766	2.525E-08	0.0000129	0.000563	0.0004878	0.7731
MODAL	Mode	9	0.54365	0.1349	0.0841	0.00005197	0.7188	0.5031	0.0001964	0.000001035	0.00001236	0.00001266	0.000564	0.0005002	0.7731
MODAL	Mode	10	0.540973	0.2228	0.0785	0.00001235	0.9415	0.5816	0.0002087	0.00006747	0.00002201	0.0003411	0.000632	0.0005222	0.7734
MODAL	Mode	11	0.537065	0.00003037	0.0978	0.000002085	0.9415	0.6794	0.0002108	0.00001406	6.979E-09	0.0518	0.000646	0.0005222	0.8252
MODAL	Mode	12	0.518379	0.0015	0.0224	0.000001898	0.943	0.7017	0.0002127	0.00005039	0.00005252	0.0027	0.000696	0.0005747	0.8279
MODAL	Mode	13	0.51703	0.0051	0.1764	0.000002618	0.9481	0.8782	0.0002153	2.057E-07	0.00001954	0.044	0.000696	0.0005942	0.8719
MODAL	Mode	14	0.511584	0.00007144	0.0538	2.267E-07	0.9482	0.932	0.0002155	0.00004596	0.00003138	0.0357	0.000742	0.0006256	0.9076
MODAL	Mode	15	0.502371	0.000001799	0.0041	2.742E-07	0.9482	0.9361	0.0002158	0.00000128	6.66E-08	0.0002149	0.000743	0.0006257	0.9078
MODAL	Mode	16	0.492364	0.00003354	0.00001213	0.000001034	0.9482	0.9361	0.0002168	6.622E-07	0.000001064	0.00004306	0.000744	0.0006268	0.9079
MODAL	Mode	17	0.475241	0.00003632	0.0011	0.00001355	0.9483	0.9372	0.0002304	0.0000169	0.00001103	0.0016	0.000761	0.0006378	0.9095
MODAL	Mode	18	0.473324	0.0014	0.0007803	0.00003975	0.9497	0.9379	0.0002701	0.00004568	0.00003693	0.00006981	0.000807	0.0006747	0.9096
MODAL	Mode	19	0.456236	0.000013	0.0003839	9.28E-09	0.9497	0.9383	0.0002702	2.052E-09	2.902E-10	0.0019	0.000807	0.0006747	0.9115
MODAL	Mode	20	0.442614	0.0008752	0.0002977	0.00004249	0.9506	0.9386	0.0003126	0.0002515	0.0003025	0.0013	0.0011	0.0009772	0.9128
MODAL	Mode	21	0.432011	0.00008546	0.0029	3.305E-10	0.9506	0.9415	0.0003126	0.00001106	0.000008793	0.0077	0.0011	0.000986	0.9205
MODAL	Mode	22	0.421112	0.00007628	0.0006397	0.00007366	0.9507	0.9422	0.0003863	0.000258	0.0002449	0.0043	0.0013	0.0012	0.9248
MODAL	Mode	23	0.395658	9.023E-07	0.0001206	0.0001	0.9507	0.9423	0.0004864	0.0002185	0.0002147	0.0001729	0.0015	0.0014	0.925
MODAL	Mode	24	0.362167	0.00007505	6.972E-07	0.00002916	0.9508	0.9423	0.0005155	0.000243	0.0002585	0.0001639	0.0018	0.0017	0.9251
MODAL	Mode	25	0.353661	0.00004932	0.0006944	3.761E-08	0.9508	0.943	0.0005155	0.00004261	0.00005358	0.0018	0.0018	0.0018	0.927
MODAL	Mode	26	0.351078	0.00001394	0.0001316	0.00002583	0.9509	0.9431	0.0005414	0.00004924	0.00004203	0.000001122	0.0019	0.0018	0.927
MODAL	Mode	27	0.339246	0.00001433	0.00006946	0.000059	0.9509	0.9432	0.0006004	0.00005737	0.00004708	0.0004617	0.0019	0.0018	0.9274
MODAL	Mode	28	0.330521	0.0000326	0.0006075	0.000207	0.9509	0.9438	0.0008074	0.0009672	0.001	0.0041	0.0029	0.0029	0.9315
MODAL	Mode	29	0.326454	0.00001505	0.00004581	0.00001858	0.9509	0.9439	0.000826	0.000008631	0.000006131	0.00002251	0.0029	0.0029	0.9315
MODAL	Mode	30	0.304151	0.00001166	0.00004848	0.00004506	0.9509	0.9439	0.000871	0.0004828	0.0005399	0.0002687	0.0034	0.0034	0.9318
MODAL	Mode	31	0.278591	0.000007861	0.00006686	0.00001423	0.9509	0.944	0.0008852	0.0001418	0.0001559	0.0003465	0.0035	0.0036	0.9321
MODAL	Mode	32	0.275988	0.000546	0.000002808	0.0312	0.9515	0.944	0.0321	0.1374	0.1441	0.000004635	0.1409	0.1476	0.9321
MODAL	Mode	33	0.27192	0.000007012	0.000723	0.00001332	0.9515	0.9447	0.0321	6.744E-08	0.000001041	0.0012	0.1409	0.1476	0.9333
MODAL	Mode	34	0.266306	0.000004139	0.0001675	0.0009809	0.9515	0.9449	0.0331	0.00006801	0.0003951	0.000296	0.141	0.148	0.9336
MODAL	Mode	35	0.26457	0.000005783	9.336E-07	0.0015	0.9515	0.9449	0.0346	0.0041	0.0041	0.000003418	0.145	0.1522	0.9336
MODAL	Mode	36	0.257867	0.000007039	0.00004977	0.0591	0.9515	0.9449	0.0936	0.2015	0.2088	0.0002806	0.3465	0.3609	0.9339
MODAL	Mode	37	0.254705	0.000002426	0.0003844	0.0011	0.9515	0.9453	0.0947	0.0041	0.004	0.0022	0.3506	0.3649	0.936
MODAL	Mode	38	0.246394	0.00001351	0.000005222	0.000002153	0.9515	0.9453	0.0947	0.0004162	0.0004871	0.00002519	0.351	0.3654	0.9361
MODAL	Mode	39	0.238499	0.00001049	0.00001898	0.0042	0.9515	0.9453	0.0989	0.0097	0.0096	0.00009034	0.3607	0.3751	0.9361
MODAL	Mode	40	0.226607	0.00000844	0.000003795	0.0027	0.9515	0.9453	0.1016	0.0001071	0.0015	0.000005003	0.3608	0.3765	0.9361
MODAL	Mode	41	0.224419	9.204E-07	0.000006256	0.0081	0.9516	0.9453	0.1098	0.0131	0.0122	0.00004016	0.3739	0.3887	0.9362
MODAL	Mode	42	0.224076	0.00000458	0.00003036	0.0484	0.9516	0.9454	0.1581	0.0097	0.00004596	0.000005598	0.3837	0.3888	0.9362
MODAL	Mode	43	0.222775	0.00002099	0.000001782	0.0536	0.9516	0.9454	0.2118	0.0363	0.053	5.716E-07	0.4199	0.4418	0.9362
MODAL	Mode	44	0.220628	3.855E-07	0.00001316	0.0037	0.9516	0.9454	0.2154	0.0175	0.0166	0.00004825	0.4375	0.4584	0.9362
MODAL	Mode	45	0.218459	0.00004654	0.00001475	0.0078	0.9516	0.9454	0.2232	0.0001298	0.0003081	0.000003742	0.4376	0.4587	0.9362
MODAL	Mode	46	0.217556	0.0004342	0.000004452	0.0119	0.9521	0.9454	0.2352	0.0068	0.0215	0.0000176	0.4443	0.4802	0.9363
MODAL	Mode	47	0.211683	0.0000102	0.00004888	0.00001155	0.9521	0.9454	0.2352	0.0003063	0.0003668	0.00004896	0.4447	0.4806	0.9363
MODAL	Mode	48	0.211506	0.00001221	0.0001191	0.00001114	0.9521	0.9456	0.2352	0.00057	0.0008443	0.0005083	0.4452	0.4814	0.9368
MODAL	Mode	49	0.207716	0.000002844	0.00002718	0.0142	0.9521	0.9456	0.2494	0.0322	0.0327	0.0001287	0.4774	0.5141	0.9369
MODAL	Mode	50	0.203017	0.000006536	0.0000421	0.0088	0.9521	0.9456	0.2583	0.0006969	0.0037	0.0001393	0.4781	0.5178	0.9371
MODAL	Mode	51	0.201467	0.000002951	0.00005595	0.0014	0.9521	0.9457	0.2597	0.0117	0.0154	0.0003721	0.4898	0.5331	0.9375
MODAL	Mode	52	0.201365	9.666E-07	0.00007578	0.0358	0.9521	0.9458	0.2955	0.0365	0.0258	0.0001921	0.5264	0.5589	0.9377
MODAL	Mode	53	0.200483	0.000006354	0.0001391	0.0549	0.9521	0.9459	0.3503	0.0819	0.0818	0.0004897	0.6083	0.6407	0.9381
MODAL	Mode	54	0.199808	0.00001212	0.000001375	0.0093	0.9521	0.9459	0.3596	0.0003493	0.003	0.000005156	0.6086	0.6436	0.9381
MODAL	Mode	55	0.197606	0.00003803	0.000005252	0.0083	0.9521	0.9459	0.368	0.0137	0.0152	0.00001549	0.6224	0.6588	0.9382
MODAL	Mode	56	0.19654	0.000005393	4.497E-07	0.0215	0.9522	0.9459	0.3895	0.0041	0.0041	0.00001788	0.6265	0.6629	0.9382
MODAL	Mode	57	0.196315	0.00001625	0.000007802	0.0255	0.9522	0.9459	0.4149	0.0002441	0.0051	0.000006271	0.6267	0.668	0.9382
MODAL	Mode	58	0.190871	0.0000214	0.00000112	0.0024	0.9522	0.9459	0.4173	0.0038	0.0037	0.00001172	0.6305	0.6717	0.9382
MODAL	Mode	59	0.189468	3.166E-07	0.0000402	0.0082	0.9522	0.946	0.4256	0.0024	0.0002032	0.0000394	0.6329	0.6719	0.9382
MODAL	Mode	60	0.185843	0.000002976	0.000004161	0.0365	0.9522	0.946	0.4621	0.0086	0.0017	0.00001884	0.6415	0.6736	0.9383
MODAL	Mode	61	0.183318	0.000006203	0.000002027	0.00002756	0.9522	0.946	0.4621	0.00006704	0.00003342	0.000009558	0.6415	0.6736	0.9383
MODAL	Mode	62	0.182697	2.754E-07	5.024E-07	0.0009723	0.9522	0.946	0.4631	0.0014	0.0038	9.473E-09	0.643	0.6775	0.9383
MODAL	Mode	63	0.18184	0.000003633	0.000001906	0.0356	0.9522	0.946	0.4986	0.0159	0.0194	0.00000546	0.6589	0.6969	0.9383
MODAL	Mode	64	0.179129	0.00002629	8.458E-07	0.006	0.9522	0.946	0.5046	0.0019	0.0024	0.000004585	0.6608	0.6993	0.9383
MODAL	Mode	65	0.179051	0.000005216	7.899E-07	0.0889	0.9522	0.946	0.5935	0.032	0.0221	4.421E-08	0.6928	0.7214	0.9383
MODAL	Mode	66	0.178062	0.00002666	0.000001292	0.00003493	0.9523	0.946	0.5936	0.00004626	0.00000806	0.000002678	0.6929	0.7214	0.9383
MODAL	Mode	67	0.176967	0.00003986	0.000001278	0.0089	0.9523	0.946	0.6025	0.0011	0.0001111	1.108E-07	0.694	0.7216	0.9383
MODAL	Mode	68	0.176583	0.00001646	2.831E-08	0.0042	0.9523	0.946	0.6066	0.0013	0.0000633	9.112E-07	0.6952	0.7216	0.9383
MODAL	Mode	69	0.176444	0.000006685	0.000009823	0.0103	0.9523	0.946	0.6169	0.0029	0.0015	0.000001651	0.6981	0.7231	0.9383
MODAL	Mode	70	0.172665	0.000007753	0.0000134	0.003	0.9523	0.946	0.6199	0.0019	0.0059	0.00002416	0.7	0.729	0.9383
MODAL	Mode	71	0.171527	8.922E-08	5.668E-07	0.0126	0.9523	0.946	0.6325	0.0019	0.0009553	3.904E-07	0.7019	0.7299	0.9383
MODAL	Mode	72	0.168662	0.000005188	0.00004362	0.0056	0.9523	0.946	0.6381	0.0052	0.0144	0.00007683	0.7071	0.7443	0.9384
MODAL	Mode	73	0.16787	3.708E-07	8.424E-09	0.005	0.9523	0.946	0.6431	0.0005726	0.00001462	0.00000224	0.7077	0.7443	0.9384
MODAL	Mode	74	0.166614	6.255E-09	2.985E-07	0.0002217	0.9523	0.946	0.6434	0.00000194	0.00006487	0.000003696	0.7077	0.7444	0.9384
MODAL	Mode	75	0.164864	3.211E-07	0.000004863	0.0045	0.9523	0.946	0.6479	0.0029	0.0034	2.541E-07	0.7106	0.7477	0.9384
MODAL	Mode	76	0.163769	2.819E-07	0.00006839	0.0053	0.9523	0.9461	0.6532	0.0002859	0.0021	0.0002032	0.7109	0.7498	0.9386
MODAL	Mode	77	0.163053	0.00001656	0.00004284	0.0000258	0.9524	0.9462	0.6532	0.0002544	0.0005271	0.000004605	0.7111	0.7504	0.9386
MODAL	Mode	78	0.161847	9.946E-07	0.000008486	0.000668	0.9524	0.9462	0.6539	0.0001058	0.0001286	0.0001539	0.7113	0.7505	0.9388
MODAL	Mode	79	0.160072	0.00003622	0.000008419	0.0045	0.9524	0.9462	0.6584	0.0001581	0.0013	0.000006652	0.7114	0.7518	0.9388
MODAL	Mode	80	0.159504	0.000007908	0.000002657	0.0039	0.9524	0.9462	0.6623	0.001	0.0039	9.577E-07	0.7124	0.7557	0.9388

MODAL	Mode	81	0.157433	0.0000522	0.000003973	0.000009788	0.9525	0.9462	0.6624	0.000001034	0.00001234	0.000004286	0.7124	0.7557	0.9388
MODAL	Mode	82	0.156791	0.00001112	5.988E-07	0.0313	0.9525	0.9462	0.6937	0.0034	0.0172	6.201E-07	0.7158	0.7729	0.9388
MODAL	Mode	83	0.154968	0.000002455	1.451E-07	0.0055	0.9525	0.9462	0.6992	0.0018	0.0063	1.867E-08	0.7176	0.7792	0.9388
MODAL	Mode	84	0.151798	0.000007348	2.341E-07	0.000155	0.9525	0.9462	0.6994	0.0000838	0.00006281	2.113E-07	0.7177	0.7793	0.9388
MODAL	Mode	85	0.149852	0.000002137	2.826E-07	0.000001493	0.9525	0.9462	0.6994	0.00006055	0.00007623	5.125E-07	0.7177	0.7793	0.9388
MODAL	Mode	86	0.149616	0.00002969	1.316E-07	0.000001653	0.9525	0.9462	0.6994	4.927E-11	0.000004455	0.000004542	0.7177	0.7793	0.9388
MODAL	Mode	87	0.149005	0.0001102	0.00001519	0.000366	0.9526	0.9462	0.6997	0.0007915	0.00085	0.0001575	0.7185	0.7802	0.9389
MODAL	Mode	88	0.147881	2.576E-07	0.000003389	0.0001101	0.9526	0.9462	0.6999	0.000001989	0.000003862	0.00003042	0.7185	0.7802	0.939
MODAL	Mode	89	0.146164	8.275E-07	0.00001247	0.000003158	0.9526	0.9462	0.6999	0.000003349	0.000003856	0.0000382	0.7185	0.7802	0.939
MODAL	Mode	90	0.144733	0.00001304	0.000001947	0.00005841	0.9526	0.9462	0.6999	4.647E-07	7.819E-07	0.00001151	0.7185	0.7802	0.939
MODAL	Mode	91	0.14419	0.000003012	0.000003005	0.0000051	0.9526	0.9462	0.6999	0.0000566	0.00009404	0.00000161	0.7186	0.7803	0.939
MODAL	Mode	92	0.142782	0.00000194	0.000001446	0.00002167	0.9526	0.9462	0.6999	0.000001721	0.000002835	0.00002648	0.7186	0.7803	0.939
MODAL	Mode	93	0.142203	0.000008004	0.000007332	0.00004819	0.9526	0.9462	0.7	0.00001882	0.000008388	0.00001992	0.7186	0.7803	0.9391
MODAL	Mode	94	0.13958	0.000007328	0.000004245	0.000000851	0.9527	0.9462	0.7	3.142E-08	0.000002635	0.000006241	0.7186	0.7803	0.9391
MODAL	Mode	95	0.138494	0.000006098	0.00000289	0.0003984	0.9527	0.9462	0.7004	0.00004845	0.0002195	0.00001813	0.7187	0.7805	0.9391
MODAL	Mode	96	0.134407	0.000005146	3.792E-08	0.00002772	0.9527	0.9462	0.7004	0.00002327	0.00002013	0.000001388	0.7187	0.7805	0.9391
MODAL	Mode	97	0.13317	0.00002447	0.000002074	0.00002323	0.9527	0.9462	0.7004	0.000005339	0.000001144	0.00005057	0.7187	0.7805	0.9391
MODAL	Mode	98	0.132439	0.00000187	0.0001096	0.000009015	0.9527	0.9463	0.7004	0.000008716	0.00001523	0.0003104	0.7187	0.7806	0.9394
MODAL	Mode	99	0.130983	6.708E-07	1.797E-07	0.00001526	0.9527	0.9463	0.7005	0.000002022	0.00001291	0.00002197	0.7187	0.7806	0.9395
MODAL	Mode	100	0.130136	0.00002592	0.000007932	0.00003039	0.9527	0.9464	0.7005	0.0000193	0.00002383	0.000002287	0.7187	0.7806	0.9395

SAP 2000 Frequency Output

Condition 2
Stiffness: Upper Bound
Mass: Lower Bound

Model: Conejo Frequency Con2

TABLE: Modal Participating Mass Ratios

OutputCase	StepType	StepNum	Period	UX	UY	UZ	SumUX	SumUY	SumUZ	RX	RY	RZ	SumRX	SumRY	SumRZ
Text	Text	Unitless	Sec	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	0.641709	0.0023	0.1861	0.000001433	0.0023	0.1861	0.000001433	0.00006107	0.000004376	0.5702	6.11E-05	0.000004376	0.5702
MODAL	Mode	2	0.564323	0.0000957	0.02	7.655E-08	0.0024	0.2061	0.000001509	0.000000266	0.000003079	0.0059	6.13E-05	0.000007455	0.5761
MODAL	Mode	3	0.526114	0.2026	0.0002702	0.0001134	0.205	0.2064	0.0001149	0.0005114	0.0005168	0.0016	0.000573	0.0005243	0.5777
MODAL	Mode	4	0.49799	0.0013	0.1436	6.968E-07	0.2063	0.35	0.0001156	0.00004172	0.000000118	0.0707	0.000615	0.0005244	0.6484
MODAL	Mode	5	0.481779	0.000002937	0.0691	0.000002072	0.2063	0.4191	0.0001177	0.00001914	3.035E-07	0.1113	0.000634	0.0005247	0.7597
MODAL	Mode	6	0.454695	0.2686	0.000001408	0.0001026	0.4749	0.4191	0.0002203	0.0002677	0.0002595	0.0013	0.000901	0.0007842	0.7609
MODAL	Mode	7	0.453892	0.0109	0.0135	0.00002302	0.4858	0.4326	0.0002433	0.00001	0.00002266	0.0107	0.000911	0.0008068	0.7716
MODAL	Mode	8	0.434186	0.3847	0.002	0.0001405	0.8705	0.4345	0.0003838	0.00003789	0.00002139	0.00007963	0.000949	0.0008282	0.7717
MODAL	Mode	9	0.431287	0.0003153	0.077	7.214E-07	0.8708	0.5115	0.0003845	0.00001716	0.000001417	0.0289	0.000966	0.0008296	0.8006
MODAL	Mode	10	0.428224	0.0338	0.1445	3.872E-07	0.9046	0.656	0.0003849	0.00004267	0.000005599	0.001	0.001	0.0008352	0.8016
MODAL	Mode	11	0.418102	0.00006285	0.0043	6.767E-07	0.9046	0.6603	0.0003856	0.0001668	0.0002377	0.0004074	0.0012	0.0011	0.802
MODAL	Mode	12	0.408636	0.00001824	0.1693	0.000001766	0.9046	0.8296	0.0003874	0.000004397	4.887E-07	0.0398	0.0012	0.0011	0.8419
MODAL	Mode	13	0.406608	0.0104	0.0886	3.231E-09	0.9151	0.9182	0.0003874	0.00002322	0.00001194	0.059	0.0012	0.0011	0.9009
MODAL	Mode	14	0.403542	0.034	0.0014	0.00002075	0.9491	0.9197	0.0004081	0.000001166	0.000001451	0.0015	0.0012	0.0011	0.9024
MODAL	Mode	15	0.398159	0.0024	0.0183	0.000004959	0.9515	0.938	0.0004131	0.00002185	0.00001172	0.0007699	0.0012	0.0011	0.9032
MODAL	Mode	16	0.391176	0.00005223	0.000001598	7.536E-08	0.9515	0.938	0.0004132	7.241E-07	2.838E-07	0.000002027	0.0012	0.0011	0.9032
MODAL	Mode	17	0.386981	0.0064	0.0006653	0.00004351	0.9579	0.9386	0.0004567	0.00007223	0.00006981	0.0002626	0.0013	0.0012	0.9035
MODAL	Mode	18	0.376166	0.0003675	0.0034	8.495E-07	0.9583	0.942	0.0004575	0.00000295	0.000003934	0.0024	0.0013	0.0012	0.9059
MODAL	Mode	19	0.364956	0.000008374	0.0009982	0.00001824	0.9583	0.943	0.0004758	0.00009634	0.00009117	0.0046	0.0014	0.0013	0.9105
MODAL	Mode	20	0.363667	0.0007398	0.0024	0.00002312	0.959	0.9454	0.0004989	0.0001719	0.0002282	0.0001513	0.0016	0.0015	0.9107
MODAL	Mode	21	0.355963	0.0001709	0.0024	2.877E-08	0.9592	0.9478	0.0004989	0.000022	0.00002111	0.0118	0.0016	0.0015	0.9225
MODAL	Mode	22	0.344833	0.0015	0.0004626	0.0001166	0.9607	0.9482	0.0006155	0.000153	0.0001241	0.002	0.0017	0.0016	0.9245
MODAL	Mode	23	0.334536	0.0007567	0.0001089	0.00001696	0.9615	0.9483	0.0006324	0.0001368	0.0001606	0.0001754	0.0019	0.0018	0.9247
MODAL	Mode	24	0.313881	0.0003308	7.339E-07	0.00003199	0.9618	0.9483	0.0006644	0.000189	0.0001943	0.0001452	0.0021	0.002	0.9248
MODAL	Mode	25	0.304832	0.000008539	0.000004644	0.00007907	0.9618	0.9483	0.0007435	0.0002927	0.0002964	0.0001469	0.0024	0.0023	0.925
MODAL	Mode	26	0.297778	0.0001127	0.0001009	0.000001663	0.9619	0.9484	0.0007452	0.000005488	0.000008924	0.00002656	0.0024	0.0023	0.925
MODAL	Mode	27	0.293835	0.00009165	0.0007167	0.000006251	0.962	0.9491	0.0007514	5.324E-08	0.000000976	0.0023	0.0024	0.0023	0.9274
MODAL	Mode	28	0.282104	0.00002539	0.0012	0.00008348	0.962	0.9503	0.0008349	0.0002729	0.000262	0.0065	0.0026	0.0026	0.9339
MODAL	Mode	29	0.276377	0.000002416	0.00002193	0.00007816	0.962	0.9503	0.0009131	4.617E-07	0.000001953	0.00007525	0.0026	0.0026	0.934
MODAL	Mode	30	0.26671	0.000008957	0.0001897	0.00002158	0.962	0.9505	0.0009347	0.0003137	0.0003459	0.0011	0.003	0.0029	0.9351
MODAL	Mode	31	0.246417	0.00005997	0.000088	0.00003597	0.9621	0.9506	0.0009706	0.0000188	0.00001559	0.0004871	0.003	0.0029	0.9356
MODAL	Mode	32	0.237336	0.0004567	5.722E-07	0.0919	0.9626	0.9506	0.0929	0.3498	0.3642	0.0000101	0.3528	0.3671	0.9356
MODAL	Mode	33	0.233856	0.000004076	0.0003589	0.0005291	0.9626	0.951	0.0934	0.00001887	0.0001592	0.0004874	0.3528	0.3672	0.9361
MODAL	Mode	34	0.230879	0.000002812	3.578E-07	0.002	0.9626	0.951	0.0955	0.0045	0.0045	5.379E-08	0.3573	0.3717	0.9361
MODAL	Mode	35	0.229598	0.00005493	0.00009657	0.0027	0.9626	0.9511	0.0981	0.0034	0.0033	0.0004129	0.3607	0.375	0.9365
MODAL	Mode	36	0.229151	0.000003545	0.0011	0.0003271	0.9626	0.9522	0.0984	0.00001392	0.0000898	0.0017	0.3607	0.3751	0.9382
MODAL	Mode	37	0.220811	0.000009211	0.0006766	0.0001447	0.9626	0.9529	0.0986	0.000817	0.0009414	0.0035	0.3615	0.376	0.9417
MODAL	Mode	38	0.219584	0.0001182	0.00001387	0.0015	0.9628	0.9529	0.1001	0.004	0.0041	0.0001108	0.3656	0.3802	0.9418
MODAL	Mode	39	0.212446	0.00001746	0.0001144	0.0035	0.9628	0.953	0.1036	0.009	0.0091	0.0005411	0.3746	0.3892	0.9424
MODAL	Mode	40	0.20106	0.000003662	0.00003116	0.0013	0.9628	0.953	0.1049	0.003	0.003	0.0001636	0.3775	0.3922	0.9425
MODAL	Mode	41	0.200398	0.000005174	0.00001072	0.0004833	0.9628	0.953	0.1054	0.0002264	0.0008212	0.000009397	0.3778	0.393	0.9425
MODAL	Mode	42	0.199679	1.466E-07	0.000004621	0.0149	0.9628	0.953	0.1203	0.036	0.0366	0.00002526	0.4138	0.4296	0.9426
MODAL	Mode	43	0.191703	0.000001463	0.00002274	0.0013	0.9628	0.9531	0.1215	0.0001405	0.000001839	4.404E-07	0.4139	0.4296	0.9426
MODAL	Mode	44	0.190676	3.977E-09	0.000001673	0.0049	0.9628	0.9531	0.1264	0.0087	0.0078	1.477E-07	0.4226	0.4374	0.9426
MODAL	Mode	45	0.1897	0.00002605	0.00004029	0.0473	0.9628	0.9531	0.1738	0.0073	0.0001873	0.00001819	0.4298	0.4376	0.9426
MODAL	Mode	46	0.188882	0.00004126	0.000007233	0.0742	0.9628	0.9531	0.248	0.0503	0.0661	3.645E-07	0.4802	0.5037	0.9426
MODAL	Mode	47	0.188258	0.00003904	0.00001319	0.0196	0.9629	0.9531	0.2676	0.0448	0.0435	0.00008722	0.525	0.5472	0.9427
MODAL	Mode	48	0.185264	0.000002254	0.0001835	0.0091	0.9629	0.9533	0.2767	0.00002095	0.0008318	0.0005181	0.525	0.548	0.9432
MODAL	Mode	49	0.185048	3.616E-08	0.000001048	0.0502	0.9629	0.9533	0.3269	0.0814	0.0756	0.000007863	0.6065	0.6236	0.9432
MODAL	Mode	50	0.182305	0.0001514	0.0001117	0.000758	0.963	0.9534	0.3277	0.0036	0.009	0.0002721	0.61	0.6326	0.9435
MODAL	Mode	51	0.181303	0.000325	0.00004578	0.0582	0.9634	0.9535	0.3859	0.0055	0.0283	0.0001604	0.6155	0.6608	0.9436
MODAL	Mode	52	0.179812	0.0000354	2.409E-08	0.0033	0.9634	0.9535	0.3893	0.0091	0.0101	0.000001549	0.6246	0.6709	0.9436
MODAL	Mode	53	0.176728	0.000004021	0.00002427	0.0046	0.9634	0.9535	0.3938	0.0001878	0.00000668	0.0007428	0.6248	0.671	0.9444
MODAL	Mode	54	0.176364	0.000004819	0.0006392	0.0049	0.9634	0.9541	0.3987	0.0025	0.0024	0.0017	0.6273	0.6734	0.9461
MODAL	Mode	55	0.17455	0.00002201	0.0000014	0.0037	0.9634	0.9541	0.4024	0.0029	0.0015	4.694E-07	0.6302	0.6748	0.9461
MODAL	Mode	56	0.17418	0.000001862	0.000008309	0.0113	0.9634	0.9541	0.4136	0.0005736	0.0002437	0.00000794	0.6308	0.6751	0.9461
MODAL	Mode	57	0.17142	0.000008124	2.426E-07	0.0007359	0.9634	0.9541	0.4144	0.000009679	0.000009371	0.000003106	0.6308	0.6751	0.9461
MODAL	Mode	58	0.170403	0.00000651	0.000005243	0.0214	0.9634	0.9541	0.4358	0.0125	0.015	0.00002573	0.6433	0.69	0.9462
MODAL	Mode	59	0.167963	0.000002063	0.000588	0.0005863	0.9634	0.9542	0.4364	0.00001149	0.0002015	0.0001819	0.6433	0.6902	0.9463
MODAL	Mode	60	0.165489	0.00001177	0.000003227	0.000384	0.9635	0.9542	0.4367	0.0002824	0.0008909	0.000009186	0.6436	0.6911	0.9463
MODAL	Mode	61	0.16192	0.000001508	0.000001231	0.0347	0.9635	0.9542	0.4715	0.0078	0.000991	0.000003283	0.6514	0.6921	0.9463
MODAL	Mode	62	0.161592	0.000002492	0.000003033	0.00007012	0.9635	0.9542	0.4715	0.00008457	0.0001167	0.00001367	0.6514	0.6922	0.9464
MODAL	Mode	63	0.159631	0.00004473	0.000000643	0.0037	0.9635	0.9542	0.4753	0.0026	0.0016	0.000005652	0.654	0.6938	0.9464
MODAL	Mode	64	0.159108	0.00002057	0.000004148	0.025	0.9635	0.9542	0.5003	0.0109	0.014	0.00001835	0.665	0.7079	0.9464
MODAL	Mode	65	0.157576	4.617E-07	0.00001838	0.0115	0.9635	0.9542	0.5118	0.0024	0.0005024	0.00001385	0.6674	0.7084	0.9464
MODAL	Mode	66	0.156321	0.00002364	0.00001517	0.0031	0.9636	0.9542	0.5149	0.0011	0.0002072	0.00001585	0.6685	0.7086	0.9464
MODAL	Mode	67	0.154983	0.000002731	0.00000195	0.1112	0.9636	0.9542	0.6261	0.0398	0.0313	4.695E-07	0.7083	0.7399	0.9464
MODAL	Mode	68	0.154465	1.736E-07	0.00001579	0.0122	0.9636	0.9543	0.6383	0.0019	0.0091	0.00004671	0.7102	0.749	0.9465
MODAL	Mode	69	0.153946	0.000002137	7.273E-07	0.0001137	0.9636	0.9543	0.6384	0.000383	0.0004066	0.000002283	0.7106	0.7494	0.9465
MODAL	Mode	70	0.153695	0.000007788	0.000002875	0.0184	0.9636	0.9543	0.6569	0.0067	0.0021	3.168E-07	0.7173	0.7516	0.9465
MODAL	Mode	71	0.152046	0.00000202	0.0000246	0.0178	0.9636	0.9543	0.6747	0.0015	0.0081	0.00004599	0.7188	0.7597	0.9465
MODAL	Mode	72	0.151441	0.000007373	4.855E-07	0.0051	0.9636	0.9543	0.6798	0.0067	0.0094	0.00001059	0.7254	0.7691	0.9465
MODAL	Mode	73	0.148492	7.045E-07	0.000002063	0.0015	0.9636	0.9543	0.6813	0.0005262	0.0001987	5.788E-09	0.7259	0.7693	0.9465
MODAL	Mode	74	0.146853	0.000005493	5.986E-07	0.0003839	0.9636	0.9543	0.6817	0.0002605	0.0011	0.00003034	0.7262	0.7704	0.9466
MODAL	Mode	75	0.145534	0.00000109	0.00001177	0.012	0.9636	0.9543	0.6936	0.0046	0.0037	0.000001248	0.7308	0.7741	0.9466
MODAL	Mode	76	0.144644	4.605E-07	0.00009645	0.0012	0.9636	0.9544	0.6948	0.0008822	0.0025	0.0005933	0.7317	0.7766	0.9471
MODAL	Mode	77	0.144303	0.0000621	0.0001274	0.0097	0.9636	0.9545	0.7045	0.0003111	0.0025	0.0001109	0.732	0.7791	0.9473
MODAL	Mode	78	0.143926	1.188E-07	0.0001019	0.0265	0.9636	0.9546	0.731	0.0031	0.0156	0.00001422	0.7351	0.7947	0.9473
MODAL	Mode	79	0.143301	0.00003559	0.00005409	0.000786	0.9637	0.9547	0.7318	0.0005492	0.0008631	0.000516	0.7356	0.7955	0.9478
MODAL	Mode	80	0.142038	0.00004689	0.000001095	0.0013	0.9637	0.9547	0.7331	0.0005923	0.0019	0.000001774	0.7362	0.7975	0.9478

MODAL	Mode	81	0.140253	0.00002776	0.00002982	0.00006144	0.9638	0.9547	0.7332	0.00001332	0.00002997	0.00002206	0.7362	0.7975	0.9478
MODAL	Mode	82	0.138483	0.0000526	0.00001119	0.00003262	0.9638	0.9547	0.7332	0.0000243	0.00008054	0.0000132	0.7362	0.7976	0.9478
MODAL	Mode	83	0.136222	7.198E-07	1.728E-08	0.000004508	0.9638	0.9547	0.7332	0.00003608	0.00005604	6.731E-07	0.7363	0.7976	0.9478
MODAL	Mode	84	0.135261	4.155E-07	0.000008402	0.00008375	0.9638	0.9547	0.7333	0.00002982	0.00002352	0.000005585	0.7363	0.7977	0.9478
MODAL	Mode	85	0.134499	0.00003323	0.000002179	0.00008333	0.9638	0.9547	0.7334	0.00006771	0.00006813	0.00001328	0.7364	0.7977	0.9478
MODAL	Mode	86	0.133823	0.00007595	0.000001878	0.000007206	0.9639	0.9547	0.7334	4.514E-08	0.000004576	0.00004134	0.7364	0.7977	0.9479
MODAL	Mode	87	0.131236	1.841E-07	0.000001397	0.0002704	0.9639	0.9547	0.7336	0.000007421	0.000002115	2.199E-07	0.7364	0.7977	0.9479
MODAL	Mode	88	0.130952	5.343E-07	0.000002085	0.0000872	0.9639	0.9547	0.7337	0.0001348	0.0001538	0.00001645	0.7365	0.7979	0.9479
MODAL	Mode	89	0.129426	0.000006341	0.00001016	0.00001366	0.9639	0.9547	0.7337	0.000002635	0.00001739	0.00001515	0.7365	0.7979	0.9479
MODAL	Mode	90	0.128329	0.000004597	0.0000053	0.00002429	0.9639	0.9548	0.7338	6.777E-09	2.912E-07	0.00001954	0.7365	0.7979	0.9479
MODAL	Mode	91	0.127239	0.00000427	0.000004301	0.0002372	0.9639	0.9548	0.734	0.00006925	0.00004282	0.00002598	0.7366	0.798	0.948
MODAL	Mode	92	0.125807	1.463E-07	0.000008296	0.0001314	0.9639	0.9548	0.7341	0.00005264	0.0001944	0.00001864	0.7366	0.7981	0.948
MODAL	Mode	93	0.125424	0.000005009	2.162E-07	0.0005417	0.9639	0.9548	0.7347	0.00003835	0.0002119	0.000000889	0.7367	0.7984	0.948
MODAL	Mode	94	0.123039	0.00001279	1.862E-07	7.132E-07	0.964	0.9548	0.7347	0.00000321	8.078E-07	0.000004629	0.7367	0.7984	0.948
MODAL	Mode	95	0.118525	5.141E-08	0.00008998	0.000008378	0.964	0.9549	0.7347	0.00001037	0.00001657	0.0003643	0.7367	0.7984	0.9484
MODAL	Mode	96	0.118133	0.000005417	0.00007339	0.00002605	0.964	0.9549	0.7347	8.615E-10	0.000002067	0.000173	0.7367	0.7984	0.9485
MODAL	Mode	97	0.117656	0.000003868	4.256E-08	0.00001226	0.964	0.9549	0.7347	2.923E-07	6.093E-08	1.955E-07	0.7367	0.7984	0.9485
MODAL	Mode	98	0.11496	0.00000531	0.00003313	0.00003288	0.964	0.955	0.7348	0.00001112	0.000002034	0.00006092	0.7367	0.7984	0.9486
MODAL	Mode	99	0.114595	0.00001012	3.239E-07	0.0002491	0.964	0.955	0.735	0.000111	0.000176	0.00002428	0.7368	0.7986	0.9486
MODAL	Mode	100	0.113486	0.000009495	0.000002143	0.00001246	0.964	0.955	0.735	7.775E-07	0.00002211	0.000005261	0.7368	0.7986	0.9486

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SAP 2000 Frequency Output

Condition 2 - Superstructure restrained at bearings
Stiffness: Lower Bound
Mass: Upper Bound

Model: v15 GS 20120807 Conejo Frequency Con1

TABLE: Modal Participating Mass Ratios

OutputCase	StepType	StepNum	Period	UX	UY	UZ	SumUX	SumUY	SumUZ	RX	RY	RZ	SumRX	SumRY	SumRZ
Text	Text	Unitless	Sec	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	0.650362	0.0029	0.2211	0.000001782	0.0029	0.2211	0.000001782	0.0000696	0.000005337	0.6297	6.96E-05	0.000005337	0.6297
MODAL	Mode	2	0.575659	0.000308	0.0229	5.419E-07	0.0032	0.244	0.000002324	1.076E-08	0.000004738	0.0088	6.96E-05	0.00001008	0.6386
MODAL	Mode	3	0.525609	0.2133	0.000394	0.0001247	0.2165	0.2444	0.0001271	0.0005317	0.000517	0.0012	0.000601	0.0005271	0.6397
MODAL	Mode	4	0.502508	0.0012	0.1651	4.367E-07	0.2177	0.4095	0.0001275	0.00004587	0.000000201	0.0923	0.000647	0.0005273	0.732
MODAL	Mode	5	0.491465	0.0028	0.0294	0.000002078	0.2205	0.4389	0.0001296	2.516E-07	0.000009184	0.0524	0.000647	0.0005365	0.7844
MODAL	Mode	6	0.463869	0.00008952	0.003	2.779E-12	0.2206	0.4419	0.0001296	3.957E-07	3.667E-07	0.0068	0.000648	0.0005369	0.7912
MODAL	Mode	7	0.438588	0.0506	0.0002335	0.0002178	0.2712	0.4421	0.0003473	0.0005441	0.0005244	0.0001231	0.0012	0.0011	0.7914
MODAL	Mode	8	0.405282	0.1529	0.0001504	0.00002939	0.4242	0.4423	0.0003767	0.00002591	0.00005975	0.00001035	0.0012	0.0011	0.7914
MODAL	Mode	9	0.394697	2.877E-07	0.0017	0.00000233	0.4242	0.444	0.0003791	0.000007058	0.000004652	0.000002547	0.0012	0.0011	0.7914
MODAL	Mode	10	0.391413	0.0052	0.0125	1.484E-08	0.4294	0.4565	0.0003791	0.000002301	9.993E-07	0.0025	0.0012	0.0011	0.7939
MODAL	Mode	11	0.368734	0.0152	0.0001821	0.0001211	0.4446	0.4567	0.0005002	0.0005069	0.0005104	0.00003495	0.0017	0.0016	0.7939
MODAL	Mode	12	0.347271	0.0298	0.00006768	0.00006879	0.4744	0.4567	0.000569	0.000004947	0.00002469	0.000008855	0.0017	0.0017	0.7939
MODAL	Mode	13	0.318915	0.00004837	0.0025	0.000000715	0.4744	0.4592	0.0005697	0.000000404	1.316E-07	0.0004047	0.0017	0.0017	0.7943
MODAL	Mode	14	0.312126	0.0038	0.0007593	0.0002063	0.4782	0.46	0.000776	0.0006932	0.0007068	0.000488	0.0024	0.0024	0.7948
MODAL	Mode	15	0.309428	0.0006293	0.0052	0.00007811	0.4789	0.4652	0.0008541	0.0002118	0.0001686	0.009	0.0026	0.0025	0.8038
MODAL	Mode	16	0.282042	0.0049	0.00002461	0.0001906	0.4838	0.4652	0.001	0.000001957	0.000003017	0.000007758	0.0026	0.0025	0.8038
MODAL	Mode	17	0.270835	0.0022	0.0003065	2.474E-08	0.4861	0.4655	0.001	0.000115	0.0001237	0.0002798	0.0028	0.0027	0.8041
MODAL	Mode	18	0.250836	1.104E-07	0.0042	0.000006533	0.4861	0.4698	0.0011	0.000001099	7.728E-09	0.0006484	0.0028	0.0027	0.8048
MODAL	Mode	19	0.250257	0.0005543	0.0005132	8.104E-07	0.4866	0.4703	0.0011	0.00002815	0.00002879	0.0002898	0.0028	0.0027	0.8051
MODAL	Mode	20	0.237371	0.0005233	0.00002911	0.1091	0.4871	0.4703	0.1102	0.379	0.3782	0.00006824	0.3818	0.3808	0.8051
MODAL	Mode	21	0.235207	0.0002077	0.0008691	0.0048	0.4873	0.4712	0.115	0.0115	0.0112	0.0002335	0.3933	0.392	0.8054
MODAL	Mode	22	0.234398	0.0023	0.00001964	0.0011	0.4897	0.4712	0.116	0.00002185	0.0002254	2.104E-08	0.3933	0.3923	0.8054
MODAL	Mode	23	0.231389	0.0004	0.00005049	0.0024	0.4901	0.4713	0.1185	0.0053	0.0051	0.00009933	0.3986	0.3974	0.8055
MODAL	Mode	24	0.227977	0.00008185	0.0001707	0.0016	0.4902	0.4714	0.1201	0.0011	0.0009254	0.00004795	0.3996	0.3983	0.8055
MODAL	Mode	25	0.22011	0.00006184	0.00007167	0.0014	0.4902	0.4715	0.1214	0.003	0.0029	0.00007797	0.4027	0.4012	0.8056
MODAL	Mode	26	0.213618	0.0004316	0.00006706	0.0047	0.4907	0.4716	0.1262	0.0116	0.0113	0.00007078	0.4143	0.4125	0.8056
MODAL	Mode	27	0.201635	0.0003232	0.00002194	0.0015	0.491	0.4716	0.1276	0.0028	0.0027	0.00001982	0.4171	0.4152	0.8057
MODAL	Mode	28	0.201034	0.0007217	0.00001861	0.0003303	0.4917	0.4716	0.128	0.0003341	0.0008604	0.0000108	0.4174	0.4161	0.8057
MODAL	Mode	29	0.199823	9.398E-07	0.0001225	0.0181	0.4917	0.4717	0.1461	0.04	0.0388	0.000139	0.4575	0.4549	0.8058
MODAL	Mode	30	0.194664	0.00001216	0.0008978	0.0000475	0.4917	0.4726	0.1461	0.000006803	2.932E-07	0.00008078	0.4575	0.4549	0.8059
MODAL	Mode	31	0.190796	0.0001757	3.208E-08	0.0038	0.4919	0.4726	0.1499	0.0083	0.008	0.000003887	0.4658	0.4629	0.8059
MODAL	Mode	32	0.188573	0.00001338	0.0001513	0.0253	0.4919	0.4728	0.1752	0.0494	0.0472	0.0002363	0.5152	0.5101	0.8061
MODAL	Mode	33	0.185328	6.332E-07	0.000256	0.0864	0.4919	0.473	0.2616	0.113	0.1061	0.0003249	0.6282	0.6162	0.8065
MODAL	Mode	34	0.18349	0.0000968	0.00001464	0.0133	0.492	0.473	0.2748	0.0006012	0.000001065	0.000001815	0.6288	0.6162	0.8065
MODAL	Mode	35	0.18341	0.000001219	0.0022	0.0037	0.492	0.4752	0.2785	0.0058	0.005	0.0027	0.6346	0.6212	0.8092
MODAL	Mode	36	0.181598	0.0007137	8.415E-07	0.0641	0.4927	0.4752	0.3426	0.0097	0.0403	6.305E-07	0.6443	0.6615	0.8092
MODAL	Mode	37	0.179846	0.00003575	0.000001909	0.0009529	0.4927	0.4752	0.3435	0.0058	0.0055	0.000001451	0.65	0.667	0.8092
MODAL	Mode	38	0.177868	0.00001253	0.000002574	0.0156	0.4928	0.4752	0.3591	0.0005055	0.00001483	0.000005235	0.6505	0.667	0.8092
MODAL	Mode	39	0.174404	0.0001641	0.000008456	0.0047	0.4929	0.4752	0.3638	0.00006468	0.0013	7.694E-08	0.6506	0.6683	0.8092
MODAL	Mode	40	0.172803	0.000007989	0.000006738	0.0389	0.4929	0.4752	0.4027	0.0074	0.00003113	0.000001131	0.658	0.6683	0.8092
MODAL	Mode	41	0.172162	8.336E-07	0.000006422	0.0343	0.4929	0.4753	0.437	0.0212	0.0298	0.00001244	0.6792	0.6981	0.8092
MODAL	Mode	42	0.171073	0.00001568	2.639E-09	0.002	0.4929	0.4753	0.439	0.0001263	0.0006816	0.000001574	0.6793	0.6988	0.8092
MODAL	Mode	43	0.16565	0.0001686	0.00002281	0.000618	0.4931	0.4753	0.4396	0.0002635	0.0009311	1.297E-07	0.6796	0.6997	0.8092
MODAL	Mode	44	0.161601	3.277E-07	0.000007511	0.0003752	0.4931	0.4753	0.44	0.0007708	0.000827	0.000009484	0.6803	0.7005	0.8092
MODAL	Mode	45	0.160072	0.0003953	0.00003281	0.0009124	0.4935	0.4753	0.4409	0.000007465	0.00001821	3.777E-07	0.6804	0.7006	0.8092
MODAL	Mode	46	0.156297	0.000018	0.0003532	0.0209	0.4935	0.4757	0.4618	0.0014	0.0001047	0.00001927	0.6817	0.7007	0.8093
MODAL	Mode	47	0.155318	0.00007833	0.0001662	1.721E-07	0.4936	0.4758	0.4618	0.0029	0.0034	0.00001233	0.6847	0.7041	0.8093
MODAL	Mode	48	0.154037	5.829E-08	0.00002177	0.0002705	0.4936	0.4759	0.4621	0.00003364	0.00008148	0.00001327	0.6847	0.7042	0.8093
MODAL	Mode	49	0.152784	0.000003625	0.0002633	0.0238	0.4936	0.4761	0.4859	0.0049	0.0188	0.00001664	0.6896	0.7229	0.8093
MODAL	Mode	50	0.152583	0.000007122	0.00009079	0.0156	0.4936	0.4762	0.5015	0.0075	0.0097	0.00005505	0.6971	0.7326	0.8093
MODAL	Mode	51	0.148617	0.00007442	0.0006367	0.0000555	0.4937	0.4768	0.5016	0.0006174	0.0012	0.00004876	0.6977	0.7339	0.8094
MODAL	Mode	52	0.147111	0.000003021	0.0012	0.0004987	0.4937	0.478	0.5021	0.0002367	0.0002691	0.0007178	0.6979	0.7342	0.8101
MODAL	Mode	53	0.144128	0.00004546	0.00001625	0.0373	0.4937	0.478	0.5394	0.0054	0.0219	8.162E-09	0.7033	0.756	0.8101
MODAL	Mode	54	0.142921	0.00002276	0.000001182	0.018	0.4938	0.478	0.5575	0.0007107	0.0004255	3.208E-07	0.704	0.7565	0.8101
MODAL	Mode	55	0.141917	0.00002576	0.00005571	0.000001202	0.4938	0.4781	0.5575	0.0016	0.0021	4.815E-07	0.7056	0.7586	0.8101
MODAL	Mode	56	0.139745	0.00001839	0.000001264	0.0094	0.4938	0.4781	0.5669	0.004	0.0052	2.415E-07	0.7096	0.7637	0.8101
MODAL	Mode	57	0.13915	0.000005932	0.000002114	0.021	0.4938	0.4781	0.5878	0.0049	0.0007747	1.851E-07	0.7145	0.7645	0.8101
MODAL	Mode	58	0.136251	0.00004744	0.000006182	0.0000183	0.4939	0.4781	0.5879	0.00005163	0.00006735	2.08E-10	0.7146	0.7646	0.8101
MODAL	Mode	59	0.13534	0.00002019	0.000004555	0.00006945	0.4939	0.4781	0.5879	0.00002861	0.00002485	9.005E-07	0.7146	0.7646	0.8101
MODAL	Mode	60	0.13377	2.616E-07	4.619E-09	0.0745	0.4939	0.4781	0.6624	0.0249	0.0185	2.796E-08	0.7395	0.7831	0.8101
MODAL	Mode	61	0.132666	0.000008794	0.00001268	0.0081	0.4939	0.4781	0.6705	0.0036	0.0051	0.00001021	0.7431	0.7882	0.8101
MODAL	Mode	62	0.131223	0.000002567	0.00001742	0.0002099	0.4939	0.4781	0.6707	0.000005709	0.00006609	6.684E-07	0.7431	0.7883	0.8101
MODAL	Mode	63	0.131041	1.358E-07	3.893E-07	0.0133	0.4939	0.4781	0.684	0.0035	0.0009438	1.738E-09	0.7466	0.7892	0.8101
MODAL	Mode	64	0.12994	0.00007673	0.00002959	0.0003102	0.494	0.4782	0.6843	0.00007436	0.000006332	1.769E-07	0.7467	0.7892	0.8101
MODAL	Mode	65	0.126813	0.00001369	0.00005859	0.0078	0.494	0.4782	0.6921	0.003	0.0032	0.00005951	0.7496	0.7924	0.8102
MODAL	Mode	66	0.125695	0.0000104	0.00004167	0.0002652	0.494	0.4783	0.6924	0.0002446	0.000548	6.132E-07	0.7499	0.793	0.8102
MODAL	Mode	67	0.125422	1.671E-07	0.00001125	0.0077	0.494	0.4783	0.7001	0.0022	0.001	0.00001123	0.752	0.794	0.8102
MODAL	Mode	68	0.124465	0.000002367	0.0000159	0.0037	0.494	0.4783	0.7037	0.0007938	0.00004981	0.000002769	0.7528	0.794	0.8102
MODAL	Mode	69	0.122127	4.075E-07	0.00004761	0.0017	0.494	0.4783	0.7055	0.0007147	0.0011	0.0000649	0.7536	0.7952	0.8103
MODAL	Mode	70	0.121383	0.00001286	0.0001188	0.0039	0.494	0.4785	0.7094	0.0013	0.0009043	0.00006581	0.7549	0.7961	0.8103
MODAL	Mode	71	0.12081	0.00003777	0.0002698	0.00002923	0.494	0.4787	0.7094	7.441E-07	0.000006115	0.000001028	0.7549	0.7961	0.8103
MODAL	Mode	72	0.119444	0.000006749	0.0014	0.00007353	0.4941	0.4802	0.7095	0.00001899	0.000001189	0.0015	0.7549	0.7961	0.8119
MODAL	Mode	73	0.118603	0.00002336	0.0001655	0.0001564	0.4941	0.4803	0.7096	0.00001416	1.751E-07	0.00001142	0.7549	0.7961	0.8119
MODAL	Mode	74	0.117617	0.000006191	0.00002298	0.00000333	0.4941	0.4804	0.7096	7.971E-08	9.114E-08	2.575E-07	0.7549	0.7961	0.8119
MODAL	Mode	75	0.116745	0.00002102	0.0002002	0.000002864	0.4941	0.4806	0.7096	1.057E-08	7.701E-08	0.00025	0.7549	0.7961	0.8121
MODAL	Mode	76	0.112918	0.00001019	0.000006191	0.00001457	0.4941	0.4806	0.7096	0.000009182	0.00003553	4.205E-08	0.7549	0.7961	0.8121
MODAL	Mode	77	0.112642	0.00006058	0.000003225	0.0003072	0.4942	0.4806	0.7099	0.0001138	0.0001188	0.000003722	0.755	0.7962	0.8121
MODAL	Mode	78	0.111871	0.000007356	1.795E-07	0.0003288	0.4942	0.4806	0.7103	0.000147	0.0002117	5.876E-07	0.7552	0.7964	0.8121
MODAL	Mode	79	0.110978	0.00002655	0.000005692	0.0001448	0.4942	0.4806	0.7104	0.00003821	0.000007935	4.683E-07	0.7552	0.7964	0.8121
MODAL	Mode	80	0.109508	0.0001192	0.000003469	0.000001949	0.4943	0.4806	0.7104	0.00001805	0.00002281	0.00001906	0.7552	0.7965	0.8122

MODAL	Mode	81	0.108734	0.000002838	1.627E-07	0.00001026	0.4943	0.4806	0.7104	0.000003946	0.000004173	4.949E-07	0.7552	0.7965	0.8122
MODAL	Mode	82	0.107465	0.00002056	0.00002447	0.0001262	0.4944	0.4806	0.7106	0.00004483	0.00006523	0.00001163	0.7553	0.7965	0.8122
MODAL	Mode	83	0.105385	0.00003792	0.00002899	0.00002355	0.4944	0.4806	0.7106	0.000007254	6.857E-07	0.000001351	0.7553	0.7965	0.8122
MODAL	Mode	84	0.105235	0.0000648	9.651E-07	4.844E-07	0.4945	0.4806	0.7106	0.00001644	0.00001981	0.000008857	0.7553	0.7966	0.8122
MODAL	Mode	85	0.104577	0.00002986	0.00003235	0.00001909	0.4945	0.4807	0.7106	0.000008913	0.00001033	0.00001619	0.7553	0.7966	0.8122
MODAL	Mode	86	0.102449	0.000000286	0.000002421	0.0001316	0.4945	0.4807	0.7107	0.0000453	0.00002447	0.000003841	0.7554	0.7966	0.8122
MODAL	Mode	87	0.101058	0.00002499	0.0006423	0.000002207	0.4945	0.4813	0.7107	0.000004154	0.000001484	0.0003725	0.7554	0.7966	0.8126
MODAL	Mode	88	0.100934	0.00001083	0.000002733	0.00001223	0.4945	0.4813	0.7107	0.000006197	0.000004263	0.0000363	0.7554	0.7966	0.8126
MODAL	Mode	89	0.100473	0.00003307	0.00006315	0.00002265	0.4946	0.4814	0.7108	0.00003473	0.00003541	0.00005634	0.7554	0.7966	0.8127
MODAL	Mode	90	0.099188	3.872E-07	0.0002853	4.048E-07	0.4946	0.4817	0.7108	0.000001876	0.000003074	0.00006298	0.7554	0.7966	0.8127
MODAL	Mode	91	0.099077	0.00002275	0.000002007	0.00009368	0.4946	0.4817	0.7109	0.00001628	0.000008098	0.00006225	0.7554	0.7966	0.8128
MODAL	Mode	92	0.098927	0.0000559	0.00000504	0.00001238	0.4946	0.4817	0.7109	0.00004439	0.00005713	0.000003303	0.7555	0.7967	0.8128
MODAL	Mode	93	0.098576	0.000008125	0.00004209	0.00006632	0.4946	0.4817	0.7109	0.00002401	0.00002173	1.519E-07	0.7555	0.7967	0.8128
MODAL	Mode	94	0.097048	3.484E-07	0.0008399	0.00001461	0.4946	0.4825	0.711	0.000007692	1.221E-07	0.00003563	0.7555	0.7967	0.8128
MODAL	Mode	95	0.096074	0.000001047	7.956E-08	0.0001234	0.4946	0.4825	0.7111	0.00005408	0.00007256	2.686E-07	0.7555	0.7968	0.8128
MODAL	Mode	96	0.095356	0.00007335	2.395E-08	9.004E-08	0.4947	0.4825	0.7111	0.000005205	0.000003512	0.000003501	0.7556	0.7968	0.8128
MODAL	Mode	97	0.095028	0.000001371	0.000001711	0.000009978	0.4947	0.4825	0.7111	0.000003737	6.317E-07	0.000001257	0.7556	0.7968	0.8128
MODAL	Mode	98	0.09414	0.00002827	2.126E-08	0.000009506	0.4947	0.4825	0.7111	0.000002605	0.000004321	0.000001225	0.7556	0.7968	0.8128
MODAL	Mode	99	0.093858	0.000008954	0.00002293	0.00004267	0.4948	0.4826	0.7111	0.00001388	0.00002575	0.00002473	0.7556	0.7968	0.8129
MODAL	Mode	100	0.092949	0.0007842	0.000002143	0.000002825	0.4955	0.4826	0.7111	0.000009391	0.0000278	0.000008673	0.7556	0.7969	0.8129

Track-Structure Interaction and Serviceability: Displacement Analysis

Conejo Crossover: B11 live load scenario

Model for B1 | Conejo Disp B11.sdb

Seismic Joint and Mid-span Displacements

C1 Dowel 1	247
C1 Midspan 1	9754
C1 Midspan 2	9727
C1 Midspan 3	9602
C1 Dowel 2	199
C2 Dowel 2	227
C2 Midspan	9252
C2 Dowel 3	228
C3 Dowel 3	258
C3 Midspan 1	9442
C3 Midspan 2	9541
C3 Midspan 3	9783
C3 Dowel 4	253

Expansion Joints

Viaduct/C1 T1	2
Viaduct/C1 T2	1
C1/C2 T1	4
C1/C2 T2	3
C2/C3 T1	5
C2/C3 T2	6
C3/Viaduct T1	1138
C3/Viaduct T2	1137

Permissible Rail Stress (TM2.10.10 Section 6.10.7)

Max

	ksi	max allow	D/C
G4-1 B11	5.5	14.0	39%
G4-2 B11	5.5	14.0	39%
G5-1 B11	8.0	23.0	35%
G5-2 B11	9.1	23.0	40%
			OK

Min

	ksi	max allow	D/C
G4-1 B1	-1.6	14.0	-11%
G4-1 B2	-2.3	14.0	-17%
G5-1 B1	-0.7	23.0	-3%
G5-2 B1	-0.9	23.0	-4%
			OK

Check Vertical Deflection Limits: TM 2.10.10 Section 6.9.4 - 6.9.5

	(ft)	(ft)	(ft)	(ft)	(ft)																	
Max of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B11	0.000	0.000	-0.001	0.000	0.000	0.144	0.000	0.000	-0.019	-0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	-0.007	0.095	0.135	0.000
G1b B11	-0.033	-0.033	-0.040	-0.040	-0.037	-0.078	-0.081	-0.037	-0.025	-0.025	-0.036	-0.036	-0.037	-0.036	-0.035	-0.054	-0.068	-0.043	-0.033	-0.060	-0.074	-0.079

Deflection Limit Factor
L = 100 ft

G1a	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
G1b	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400

Vertical Defl Limits	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)
G1a	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343
G1b	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500

D/C

G1a	0.0%	0.0%	0.2%	0.0%	0.0%	42.1%	0.0%	0.0%	5.5%	4.6%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	14.4%	2.1%	27.6%	39.3%	0.0%	OK
G1b	6.6%	6.5%	8.0%	7.9%	7.4%	15.5%	16.2%	7.4%	4.9%	4.9%	7.2%	7.2%	7.5%	7.3%	7.0%	10.9%	13.6%	8.7%	6.6%	11.9%	14.8%	15.7%	OK

Check Transverse Deflection Limits: TM 2.10.10 Section 6.9.7

	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)														
Max of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B11	0.000	0.000	-0.001	0.000	0.000	0.144	0.000	0.000	-0.019	-0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	-0.007	0.095	0.135	0.000
G1b B11	-0.033	-0.033	-0.040	-0.040	-0.037	-0.078	-0.081	-0.037	-0.025	-0.025	-0.036	-0.036	-0.037	-0.036	-0.035	-0.054	-0.068	-0.043	-0.033	-0.060	-0.074	-0.079
G3 B11 minus OBE	0.000	0.000	0.000	0.000	0.000	0.056	0.000	0.000	-0.011	-0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	-0.004	0.035	0.052	0.000

Max of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
OBE1-1	0.374	0.377	0.386	0.386	0.404	0.319	0.343	0.407	0.373	0.375	0.353	0.354	0.368	0.382	0.379	0.298	0.318	0.283	0.380	0.288	0.316	0.339
OBE1-2	0.368	0.370	0.411	0.411	0.406	0.392	0.334	0.406	0.366	0.364	0.338	0.338	0.371	0.374	0.384	0.328	0.322	0.327	0.386	0.351	0.387	0.330
OBE2-1	0.349	0.352	0.379	0.376	0.361	0.343	0.406	0.360	0.361	0.356	0.335	0.333	0.354	0.348	0.350	0.346	0.348	0.291	0.364	0.296	0.335	0.399
OBE2-2	0.409	0.409	0.395	0.395	0.362	0.402	0.415	0.363	0.433	0.431	0.373	0.373	0.372	0.363	0.387	0.337	0.368	0.311	0.412	0.347	0.392	0.411
OBE3-1	0.407	0.402	0.397	0.401	0.380	0.450	0.479	0.378	0.406	0.413	0.386	0.386	0.393	0.385	0.393	0.413	0.443	0.399	0.404	0.417	0.445	0.474
OBE3-2	0.453	0.457	0.447	0.445	0.434	0.338	0.361	0.436	0.460	0.455	0.380	0.380	0.406	0.406	0.445	0.362	0.352	0.358	0.450	0.340	0.335	0.359
OBE4-1	0.362	0.363	0.411	0.413	0.371	0.383	0.379	0.369	0.381	0.383	0.338	0.339	0.363	0.356	0.357	0.320	0.339	0.330	0.395	0.353	0.376	0.375
OBE4-2	0.387	0.390	0.451	0.449	0.429	0.278	0.286	0.429	0.393	0.387	0.343	0.342	0.386	0.383	0.404	0.278	0.276	0.287	0.418	0.252	0.274	0.284
OBE5-1	0.341	0.336	0.342	0.346	0.337	0.292	0.298	0.336	0.350	0.356	0.326	0.328	0.335	0.333	0.338	0.255	0.264	0.288	0.348	0.266	0.285	0.296
OBE5-2	0.374	0.373	0.400	0.401	0.386	0.310	0.337	0.385	0.383	0.383	0.350	0.349	0.373	0.369	0.363	0.341	0.337	0.327	0.389	0.311	0.306	0.336
OBE6-1	0.412	0.418	0.444	0.442	0.451	0.305	0.349	0.451	0.425	0.416	0.396	0.395	0.412	0.426	0.406	0.337	0.331	0.313	0.418	0.282	0.300	0.344
OBE6-2	0.439	0.437	0.449	0.447	0.423	0.435	0.445	0.423	0.436	0.438	0.394	0.393	0.411	0.404	0.414	0.406	0.427	0.392	0.441	0.404	0.425	0.442
OBE7-1	0.373	0.373	0.404	0.406	0.395	0.374	0.405	0.395	0.394	0.391	0.333	0.333	0.351	0.354	0.369	0.387	0.396	0.382	0.391	0.376	0.373	0.403
OBE7-2	0.387	0.389	0.422	0.424	0.395	0.325	0.360	0.391	0.393	0.392	0.379	0.379	0.397	0.386	0.378	0.346	0.334	0.329	0.398	0.305	0.323	0.357
Average	0.388	0.389	0.410	0.410	0.395	0.353	0.371	0.395	0.397	0.396	0.359	0.359	0.378	0.376	0.383	0.340	0.347	0.330	0.400	0.328	0.348	0.368

U2

G1a	0.000	0.000	-0.001	0.000	0.000	0.144	0.000	0.000	-0.019	-0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	-0.007	0.095	0.135	0.000
G1b	-0.033	-0.033	-0.040	-0.040	-0.037	-0.078	-0.081	-0.037	-0.025	-0.025	-0.036	-0.036	-0.037	-0.036	-0.035	-0.054	-0.068	-0.043	-0.033	-0.060	-0.074	-0.079
G3	0.388	0.389	0.409	0.410	0.395	0.410	0.371	0.395	0.386	0.386	0.359	0.358	0.378	0.376	0.383	0.340	0.347	0.346	0.395	0.362	0.400	0.368

Deflection Limit Factor
L = 286 ft

G1a	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800
G1b	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200
G3	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800

Transverse Defl Limits	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)									
G1a	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135
G1b	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195
G3	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546

D/C

G1a	0.0%	0.0%	0.1%	0.0%	0.0%	12.7%	0.0%	0.0%	1.7%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.3%	0.6%	8.3%	11.9%	0.0%	OK
G1b	1.5%	1.5%	1.8%	1.8%	1.7%	3.5%	3.7%	1.7%	1.1%	1.1%	1.6%	1.6%	1.7%	1.7%	1.6%	2.5%	3.1%	2.0%	1.5%	2.7%	3.4%	3.6%	OK
G3	10.9%	11.0%	11.5%	11.6%	11.1%	11.6%	10.5%	11.1%	10.9%	10.9%	10.1%	10.1%	10.7%	10.6%	10.8%	9.6%	9.8%	9.8%	11.1%	10.2%	11.3%	10.4%	OK

	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)													
Min of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B11	0.000	0.000	-0.001	0.000	0.000	0.144	0.000	0.000	-0.019	-0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	-0.007	0.095	0.135	0.000
G1b B11	-0.033	-0.033	-0.040	-0.040	-0.037	-0.078	-0.081	-0.037	-0.025	-0.025	-0.036	-0.036	-0.037	-0.036	-0.035	-0.054	-0.068	-0.043	-0.033	-0.060	-0.074	-0.079
G3 B11 minus OBE	0.000	0.000	0.000	0.000	0.000	0.056	0.000	0.000	-0.011	-0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	-0.004	0.035	0.052	0.000

Min of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
OBE1-1	-0.419	-0.419	-0.422	-0.424	-0.417	-0.347	-0.308	-0.419	-0.427	-0.430	-0.370	-0.371	-0.390	-0.396	-0.406	-0.338	-0.297	-0.346	-0.426	-0.301	-0.338	-0.304
OBE1-2	-0.374	-0.373	-0.415	-0.415	-0.402	-0.439	-0.352	-0.401	-0.371	-0.371	-0.365	-0.364	-0.375	-0.376	-0.386	-0.353	-0.352	-0.386	-0.392	-0.413	-0.435	-0.352
OBE2-1	-0.387	-0.389	-0.406	-0.410	-0.388	-0.327	-0.349	-0.387	-0.405	-0.397	-0.364	-0.362	-0.380	-0.376	-0.375	-0.339	-0.321	-0.319	-0.397	-0.301	-0.321	-0.345
OBE2-2	-0.411	-0.416	-0.420	-0.420	-0.389	-0.420	-0.443	-0.391	-0.424	-0.420	-0.355	-0.355	-0.364	-0.355	-0.401	-0.352	-0.404	-0.344	-0.417	-0.384	-0.415	-0.440
OBE3-1	-0.321	-0.326	-0.344	-0.340	-0.352	-0.326	-0.300	-0.354	-0.332	-0.327	-0.349	-0.349	-0.337	-0.350	-0.328	-0.268	-0.280	-0.252	-0.336	-0.281	-0.319	-0.296
OBE3-2	-0.406	-0.411	-0.422	-0.419	-0.419	-0.336	-0.360	-0.421	-0.416	-0.412	-0.376	-0.376	-0.385	-0.391	-0.412	-0.355	-0.341	-0.346	-0.415	-0.322	-0.335	-0.358
OBE4-1	-0.396	-0.398	-0.421	-0.423	-0.397	-0.439	-0.375	-0.396	-0.394	-0.397	-0.363	-0.363	-0.384	-0.382	-0.371	-0.345	-0.352	-0.365	-0.408	-0.358	-0.425	-0.372
OBE4-2	-0.371	-0.370	-0.387	-0.383	-0.386	-0.324	-0.324	-0.386	-0.389	-0.384	-0.337	-0.336	-0.351	-0.354	-0.360	-0.332	-0.314	-0.327	-0.377	-0.296	-0.318	-0.318
OBE5-1	-0.337	-0.334	-0.341	-0.343	-0.333	-0.306	-0.363	-0.333	-0.351	-0.353	-0.317	-0.318	-0.329	-0.326	-0.334	-0.290	-0.320	-0.304	-0.346	-0.277	-0.298	-0.359
OBE5-2	-0.379	-0.377	-0.420	-0.420	-0.398	-0.312	-0.356	-0.397	-0.386	-0.386	-0.371	-0.371	-0.388	-0.380	-0.386	-0.353	-0.341	-0.325	-0.402	-0.297	-0.309	-0.350
OBE6-1	-0.415	-0.423	-0.425	-0.422	-0.416	-0.329	-0.357	-0.417	-0.431	-0.421	-0.364	-0.363	-0.389	-0.391	-0.410	-0.339	-0.314	-0.312	-0.419	-0.252	-0.314	-0.350
OBE6-2	-0.384	-0.382	-0.390	-0.388	-0.356	-0.319	-0.306	-0.356	-0.389	-0.390	-0.329	-0.328	-0.351	-0.338	-0.349	-0.273	-0.267	-0.266	-0.380	-0.261	-0.311	-0.303
OBE7-1	-0.390	-0.387	-0.416	-0.417	-0.410	-0.422	-0.422	-0.410	-0.409	-0.411	-0.342	-0.341	-0.361	-0.379	-0.381	-0.362	-0.394	-0.369	-0.412	-0.395	-0.416	-0.416
OBE7-2	-0.369	-0.372	-0.413	-0.415	-0.387	-0.406	-0.435	-0.384	-0.372	-0.371	-0.361	-0.360	-0.386	-0.375	-0.368	-0.355	-0.399	-0.339	-0.387	-0.373	-0.401	-0.430
Average	-0.383	-0.384	-0.403	-0.403	-0.389	-0.361	-0.361	-0.389	-0.393	-0.391	-0.355	-0.354	-0.369	-0.369	-0.376	-0.332	-0.335	-0.329	-0.394	-0.322	-0.354	-0.357

U2

G1a	0.000	0.000	-0.001	0.000	0.000	0.144	0.000	0.000	-0.019	-0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	-0.007	0.095	0.135	0.000
G1b	-0.033	-0.033	-0.040	-0.040	-0.037	-0.078	-0.081	-0.037	-0.025	-0.025	-0.036	-0.036	-0.037	-0.036	-0.035	-0.054	-0.068	-0.043	-0.033	-0.060	-0.074	-0.079
G3	-0.383	-0.384	-0.403	-0.403	-0.389	-0.304	-0.361	-0.389	-0.404	-0.400	-0.355	-0.354	-0.369	-0.369	-0.376	-0.332	-0.335	-0.312	-0.398	-0.287	-0.302	-0.357

Deflection Limit Factor
L = 286 ft

G1a	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800
G1b	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200
G3	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800

Vertical Defl Limits	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)									
G1a	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135
G1b	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195
G3	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546

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D/C

G1a	0.0%	0.0%	0.1%	0.0%	0.0%	12.7%	0.0%	0.0%	1.7%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.3%	0.6%	8.3%	11.9%	0.0%	OK
G1b	1.5%	1.5%	1.8%	1.8%	1.7%	3.5%	3.7%	1.7%	1.1%	1.1%	1.6%	1.6%	1.7%	1.7%	1.6%	2.5%	3.1%	2.0%	1.5%	2.7%	3.4%	3.6%	OK
G3	10.8%	10.8%	11.4%	11.4%	11.0%	8.6%	10.2%	11.0%	11.4%	11.3%	10.0%	10.0%	10.4%	10.4%	10.6%	9.4%	9.5%	8.8%	11.2%	8.1%	8.5%	10.1%	OK

Check Rotation about Transverse Axis Deflection Limits: TM 2.10.10 Section 6.9.8

	(rad)	(rad)						
Max of R3	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B11	-0.000213	0.000105	0.000012	0.000018	0.000001147	0.000001504	3.502E-08	2.17E-08
G1b B11	-0.00034	-0.000397	0.00002	0.000014	0.000001757	0.000005159	0.000108	0.000037
G3 B11 minus OBE	-0.00019	0.000012	0.000009163	0.000012	8.142E-07	0.000001068	2.485E-08	1.54E-08

Seismic

Max	0.000322429	0.0004234	0.000207	0.000226	0.0001635	0.000179143	0.0005358	0.000349
Min	-0.000325929	-0.000419	-0.000202929	-0.00022	-0.000162714	-0.000177643	-0.0005294	-0.000344

Total

G1a	-2.E-04	1.E-04	1.E-05	2.E-05	1.E-06	2.E-06	4.E-08	2.E-08
G1b	-3.E-04	-4.E-04	2.E-05	1.E-05	2.E-06	5.E-06	1.E-04	4.E-05
G2	-2.E-04	1.E-05	9.E-06	1.E-05	8.E-07	1.E-06	2.E-08	2.E-08
G3 (max)	1.E-04	4.E-04	2.E-04	2.E-04	2.E-04	2.E-04	5.E-04	3.E-04
G3 (min)	-5.E-04	-4.E-04	-2.E-04	-2.E-04	-2.E-04	-2.E-04	-5.E-04	-3.E-04

Defl Limits

G1a	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012
G1b	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
G2	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026
G3	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026

G1a	17.8%	8.8%	1.0%	1.5%	0.1%	0.1%	0.0%	0.0%	OK
G1b	20.0%	23.4%	1.2%	0.8%	0.1%	0.3%	6.4%	2.2%	OK
G2	7.3%	0.5%	0.4%	0.5%	0.0%	0.0%	0.0%	0.0%	OK
G3	19.8%	16.7%	8.3%	9.1%	6.3%	6.9%	20.6%	13.4%	OK

Check Relative Displacement of Longitudinal Deflection Limits: TM 2.10.10 Section 6.9.8

Group

Max of U1	Column Labels							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B11	0.047876	0.006609	0.003451	0.00472	0.000312	0.000295	0.000013	0.000014
G1b B11	0.048109	0.067624	0.004859	0.00316	0.000853	0.001173	-0.003573	-0.00043
G3 B11 minus OBE	0.040034	0.016423	0.002548	0.00328	0.000221	0.000209	9.38E-06	0.00001

Seismic

Max	0.104146714	0.1165912	0.048791786	0.045615	0.037537357	0.031776857	0.1209479	0.117713
Min	-0.112365214	-0.117997	-0.047426786	-0.045749	-0.037517286	-0.031713143	-0.1228512	-0.118799

Total

G1a	0.047876	0.006609	0.003451	0.00472	0.000312	0.000295	0.000013	0.000014
G1b	0.048109	0.067624	0.004859	0.00316	0.000853	0.001173	-0.003573	-0.00043
G3 (max)	0.144180714	0.1330142	0.051339786	0.048895	0.037758357	0.031985857	0.1209573	0.117723
G3 (min)	-0.072331214	-0.101574	-0.044878786	-0.042469	-0.037296286	-0.031504143	-0.1228418	-0.118789

Defl Limits

G1a	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300
G1b	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300
G3	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700

G1a	14.5%	2.0%	1.0%	1.4%	0.1%	0.1%	0.0%	0.0%	OK
G1b	14.6%	20.5%	1.5%	1.0%	0.3%	0.4%	1.1%	0.1%	OK
G3	21.5%	19.9%	7.7%	7.3%	5.6%	4.8%	18.3%	17.7%	OK

Check Rotation about Vertical Axis Deflection Limits: TM 2.10.10 Section 6.9.9

	(rad)	(rad)	(rad)	(rad)	(rad)	(rad)		
Max of R2	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B11	-0.000136	-0.000132	0.000005516	5.58E-06	1.935E-08	1.81E-08	1.838E-09	1.05E-09
G1b B11	0.000077	0.000079	-0.00000664	-7.44E-06	-0.000002069	-7.598E-07	-0.000034	-0.000018
G3 B11 minus OBE	-0.000075	-0.000074	0.000003164	3.18E-06	1.347E-08	1.261E-08	1.304E-09	7.42E-10

Seismic

Max	2E-04	2E-04	6E-05	7E-05	6E-05	5E-05	2E-04	1E-04
Min	-2E-04	-2E-04	-6E-05	-7E-05	-6E-05	-5E-05	-2E-04	-1E-04

Total

G1a	-1.E-04	-1.E-04	6.E-06	6.E-06	2.E-08	2.E-08	2.E-09	1.E-09
G1b	8.E-05	8.E-05	-7.E-06	-7.E-06	-2.E-06	-8.E-07	-3.E-05	-2.E-05
G3 (max)	1.E-04	1.E-04	7.E-05	7.E-05	6.E-05	5.E-05	2.E-04	1.E-04
G3 (min)	-3.E-04	-3.E-04	-6.E-05	-6.E-05	-6.E-05	-5.E-05	-2.E-04	-1.E-04

Defl Limits

G1a	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
G1b	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
G3	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021

G1a	19.4%	18.9%	0.8%	0.8%	0.0%	0.0%	0.0%	0.0%	OK
G1b	7.7%	7.9%	0.7%	0.7%	0.2%	0.1%	3.4%	1.8%	OK
G3	13.3%	14.2%	3.2%	3.4%	2.8%	2.5%	10.7%	6.6%	OK

Check Deck Twist: TM 2.10.10 Section 6.9.10

Total	rads per 10ft
G1a	9.507E-04
G1b	1.666E-04
G2	6.179E-04
G3 max	1.370E-03
G3 min	2.063E-05

Limits

Gauge 4.75 ft

	rads/10ft	in/10ft
G1a	0.0011	0.06
G1b	0.0011	0.06
G2	0.0030	0.17
G3	0.0030	0.17

D/C		
G1a	90.3%	OK
G1b	15.8%	OK
G2	20.7%	OK
G3	45.9%	OK

Check Relative Longitudinal Displacement at Expansion Joint: TM 2.10.10 Section 6.10.3

Rotation

Group

Max of R3	Column Labels							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B11	0.000064	-0.000256	0.000164	0.000342	0.000383	0.000376	-0.000024	0.000567
G4-2 B11	-0.000808	-0.00011	-0.000176	-0.000361	-0.000384	-0.000377	0.000024	-0.000567
G5-1 B11 minus OBE	-0.000019	0.000185	-0.000043	0.000031	0.000066	0.000029	-0.000096	0.000223
G5-2 B11 minus OBE	-0.000466	0.000205	0.000033	-0.000046	-0.000067	-0.000029	0.000096	-0.000223

Seismic

Max	3.E-04	4.E-04	2.E-04	2.E-04	2.E-04	2.E-04	5.E-04	3.E-04
Min	-3.E-04	-4.E-04	-2.E-04	-2.E-04	-2.E-04	-2.E-04	-5.E-04	-3.E-04

Total

G4-1	6.E-05	-3.E-04	2.E-04	3.E-04	4.E-04	4.E-04	-2.E-05	6.E-04
G4-2	-8.E-04	-1.E-04	-2.E-04	-4.E-04	-4.E-04	-4.E-04	2.E-05	-6.E-04
G5-1 (max)	3.E-04	6.E-04	2.E-04	3.E-04	2.E-04	2.E-04	4.E-04	6.E-04
G5-1 (min)	-3.E-04	-2.E-04	-2.E-04	-2.E-04	-1.E-04	-1.E-04	-6.E-04	-1.E-04
G5-2 (max)	-1.E-04	6.E-04	2.E-04	2.E-04	1.E-04	2.E-04	6.E-04	1.E-04
G5-2 (min)	-8.E-04	-2.E-04	-2.E-04	-3.E-04	-2.E-04	-2.E-04	-4.E-04	-6.E-04

Distance to rails 30.0 in

Equivalent deflection

G4-1	2.E-03	-8.E-03	5.E-03	1.E-02	1.E-02	1.E-02	-7.E-04	2.E-02
G4-2	-2.E-02	-3.E-03	-5.E-03	-1.E-02	-1.E-02	-1.E-02	7.E-04	-2.E-02
G5-1 (max)	9.E-03	2.E-02	5.E-03	8.E-03	7.E-03	6.E-03	1.E-02	2.E-02
G5-1 (min)	-1.E-02	-7.E-03	-7.E-03	-6.E-03	-3.E-03	-4.E-03	-2.E-02	-4.E-03
G5-2 (max)	-4.E-03	2.E-02	7.E-03	5.E-03	3.E-03	5.E-03	2.E-02	4.E-03
G5-2 (min)	-2.E-02	-6.E-03	-5.E-03	-8.E-03	-7.E-03	-6.E-03	-1.E-02	-2.E-02

Deflection

Group

Max of U1	Column Labels							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B11	0.03716	0.058787	-0.395453	-0.396395	-0.412641	-0.406968	-0.2656	-0.292501
G4-2 B11	0.492598	0.444311	0.413242	0.416493	0.414619	0.408918	0.265606	0.29251
G5-1 B11 minus OBE	0.050414	0.018544	-0.190191	-0.18844	-0.200395	-0.196209	-0.129299	-0.144065
G5-2 B11 minus OBE	0.268226	0.211203	0.20142	0.203986	0.20128	0.197062	0.12932	0.144087

Seismic

Max	0.104146714	0.1165912	0.048791786	0.045615	0.037537357	0.031776857	0.1209479	0.117713
Min	-0.112365214	-0.117997	-0.047426786	-0.045749	-0.037517286	-0.031713143	-0.1228512	-0.118799

Total

G4-1	4.E-02	6.E-02	-4.E-01	-4.E-01	-4.E-01	-4.E-01	-3.E-01	-3.E-01
G4-2	5.E-01	4.E-01	4.E-01	4.E-01	4.E-01	4.E-01	3.E-01	3.E-01
G5-1 (max)	2.E-01	1.E-01	-1.E-01	-1.E-01	-2.E-01	-2.E-01	-8.E-03	-3.E-02
G5-1 (min)	-6.E-02	-1.E-01	-2.E-01	-2.E-01	-2.E-01	-2.E-01	-3.E-01	-3.E-01
G5-2 (max)	4.E-01	3.E-01	3.E-01	2.E-01	2.E-01	2.E-01	3.E-01	3.E-01
G5-2 (min)	2.E-01	9.E-02	2.E-01	2.E-01	2.E-01	2.E-01	6.E-03	3.E-02

Defl Limits

L (ft)	319	319	330	330	330	330	322	322
ΔT (°F)	40	40	40	40	40	40	40	40
α	0.000006	0.000006	0.000006	0.000006	0.000006	0.000006	0.000006	0.000006
δTD (in)	0.91872	0.91872	0.9504	0.9504	0.9504	0.9504	0.92736	0.92736

G4	1.9187	1.9187	1.9504	1.9504	1.9504	1.9504	1.9274	1.9274
G5	2.7894	2.7894	2.8052	2.8052	2.8052	2.8052	2.7937	2.7937

D/C

G4	25.7%	23.2%	21.2%	21.4%	21.3%	21.0%	13.8%	15.2%	OK
G5	13.3%	11.8%	8.9%	8.9%	8.5%	8.2%	9.0%	9.4%	OK

Check Relative Vertical Displacement at Expansion Joint: TM 2.10.10 Section 6.10.4

Group

Max of U2	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B11	0.02231	0.044088	-0.005013	-0.001657	0.002694	0.000255	-0.008834	0.011216
G4-2 B11	-0.001119	0.053733	0.002169	-0.000894	-0.002984	-0.000462	0.008824	-0.011242
G5-1 B11 minus OBE	-0.103975	0.077481	-0.003125	-0.00124	0.001808	0.000377	-0.009705	0.00321
G5-2 B11 minus OBE	-0.076586	0.065376	0.001432	-0.000692	-0.001921	-0.000454	0.009702	-0.003217

Seismic

Max	0.1154	0.0433	0.0515	0.0373	0.0468	0.0334	0.0356	0.1216
Min	-0.1112	-0.0458	-0.0494	-0.0360	-0.0446	-0.0320	-0.0368	-0.1225

Total

G4-1	2.E-02	4.E-02	-5.E-03	-2.E-03	3.E-03	3.E-04	-9.E-03	1.E-02
G4-2	-1.E-03	5.E-02	2.E-03	-9.E-04	-3.E-03	-5.E-04	9.E-03	-1.E-02
G5-1 (max)	1.E-02	1.E-01	5.E-02	4.E-02	5.E-02	3.E-02	3.E-02	1.E-01
G5-1 (min)	-2.E-01	3.E-02	-5.E-02	-4.E-02	-4.E-02	-3.E-02	-5.E-02	-1.E-01
G5-2 (max)	4.E-02	1.E-01	5.E-02	4.E-02	4.E-02	3.E-02	5.E-02	1.E-01
G5-2 (min)	-2.E-01	2.E-02	-5.E-02	-4.E-02	-5.E-02	-3.E-02	-3.E-02	-1.E-01

Defl Limits

G4	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
G5	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

D/C

G4	8.9%	21.5%	2.0%	0.7%	1.2%	0.2%	3.5%	4.5%	OK
G5	43.0%	24.2%	10.6%	7.5%	9.7%	6.8%	9.3%	25.2%	OK

Check Relative Transverse Displacement at Expansion Joint: TM 2.10.10 Section 6.10.5

Group

Max of U3	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B11	0.002973	-0.00283	0.000065	-0.000049	-0.000126	-0.000022	-0.000234	0.000548
G4-2 B11	-0.002946	0.003064	-0.000057	0.000056	0.000127	0.000023	0.000234	-0.000548
G5-1 B11 minus OBE	0.001642	-0.001163	0.000049	-8.29E-06	-0.000066	-0.000006381	-0.000116	0.000265
G5-2 B11 minus OBE	-0.001349	0.001712	-0.000021	0.000044	0.000066	0.000006987	0.000116	-0.000265

Seismic

Max	0.000336714	0.0008559	0.000111143	0.000191	0.000155643	0.000117786	0.0003479	0.000448
Min	-0.000330214	-0.000857	-0.000108143	-0.000195	-0.000155571	-0.000119429	-0.0003426	-0.000462

Total

G4-1	3.E-03	-3.E-03	7.E-05	-5.E-05	-1.E-04	-2.E-05	-2.E-04	5.E-04
G4-2	-3.E-03	3.E-03	-6.E-05	6.E-05	1.E-04	2.E-05	2.E-04	-5.E-04
G5-1 (max)	2.E-03	-3.E-04	2.E-04	2.E-04	9.E-05	1.E-04	2.E-04	7.E-04
G5-1 (min)	1.E-03	-2.E-03	-6.E-05	-2.E-04	-2.E-04	-1.E-04	-5.E-04	-2.E-04
G5-2 (max)	-1.E-03	3.E-03	9.E-05	2.E-04	2.E-04	1.E-04	5.E-04	2.E-04
G5-2 (min)	-2.E-03	9.E-04	-1.E-04	-2.E-04	-9.E-05	-1.E-04	-2.E-04	-7.E-04

Defl Limits

G4	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800
G5	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600

D/C

G4	3.7%	3.8%	0.1%	0.1%	0.2%	0.0%	0.3%	0.7%	OK
G5	1.2%	1.6%	0.1%	0.1%	0.1%	0.1%	0.3%	0.5%	OK

Track-Structure Interaction and Serviceability: Displacement Analysis

Conejo Crossover: B32 live load scenario

Model for B1 Conejo Disp B32.sdb

Seismic Joint and Mid-span Displacements

C1 Dowel 1	247
C1 Midspan 1	9754
C1 Midspan 2	9727
C1 Midspan 3	9602
C1 Dowel 2	199
C2 Dowel 2	227
C2 Midspan	9252
C2 Dowel 3	228
C3 Dowel 3	258
C3 Midspan 1	9442
C3 Midspan 2	9541
C3 Midspan 3	9783
C3 Dowel 4	253

Expansion Joints

Viaduct/C1 T1	2
Viaduct/C1 T2	1
C1/C2 T1	4
C1/C2 T2	3
C2/C3 T1	5
C2/C3 T2	6
C3/Viaduct T1	1138
C3/Viaduct T2	1137

Permissible Rail Stress (TM2.10.10 Section 6.10.7)

Max

	ksi	max allow	D/C
G4-1 B11	4.6	14.0	33%
G4-2 B11	4.8	14.0	34%
G5-1 B11	7.2	23.0	31%
G5-2 B11	9.1	23.0	40%
			OK

Min

	ksi	max allow	D/C
G4-1 B1	-3.7	14.0	-26%
G4-1 B2	-3.5	14.0	-25%
G5-1 B1	-0.7	23.0	-3%
G5-2 B1	-1.5	23.0	-7%
			OK

Check Vertical Deflection Limits: TM 2.10.10 Section 6.9.4 - 6.9.5

	(ft)	(ft)	(ft)	(ft)	(ft)																	
Max of U3	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B32	0.000	0.000	-0.102	-0.123	-0.058	-0.141	0.000	-0.020	-0.162	-0.154	-0.117	-0.119	-0.106	-0.090	0.000	0.000	0.000	-0.146	-0.112	-0.153	-0.169	0.000
G1b B32	-0.003	-0.003	-0.158	-0.183	-0.156	-0.157	-0.014	-0.051	-0.227	-0.220	-0.215	-0.231	-0.179	-0.197	-0.001	-0.003	-0.003	-0.212	-0.166	-0.219	-0.202	-0.014

Deflection Limit Factor

L = 100 ft

G1a	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
G1b	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400

Vertical Defl Lim	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)
G1a	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343
G1b	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500

D/C

G1a	0.0%	0.0%	29.8%	35.8%	16.8%	41.0%	0.0%	5.7%	47.3%	45.0%	34.1%	34.6%	30.9%	26.2%	0.0%	0.0%	0.0%	42.5%	32.7%	44.5%	49.3%	0.0%	OK
G1b	0.6%	0.6%	31.6%	36.6%	31.2%	31.4%	2.8%	10.2%	45.3%	43.9%	43.1%	46.2%	35.8%	39.4%	0.3%	0.5%	0.7%	42.5%	33.2%	43.8%	40.4%	2.7%	OK

Check Transverse Deflection Limits: TM 2.10.10 Section 6.9.7

	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)														
Max of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B32	0.000	0.000	0.005	0.005	-0.006	0.165	0.000	-0.005	-0.006	-0.003	-0.007	-0.007	-0.001	-0.007	-0.002	0.000	0.000	0.066	0.002	0.114	0.155	0.000
G1b B32	-0.032	-0.031	-0.062	-0.062	-0.074	-0.056	-0.081	-0.075	-0.037	-0.037	-0.074	-0.073	-0.067	-0.074	-0.050	-0.054	-0.068	-0.040	-0.050	-0.046	-0.053	-0.079
G3 B32 minus O	0.001	0.001	-0.032	-0.032	-0.038	0.073	0.000	-0.036	-0.037	-0.035	-0.044	-0.043	-0.038	-0.041	-0.014	0.001	0.000	0.009	-0.033	0.040	0.067	0.000

Max of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
OBE1-1	0.355	0.357	0.377	0.378	0.391	0.487	0.338	0.390	0.350	0.351	0.338	0.338	0.332	0.369	0.368	0.294	0.315	0.332	0.357	0.398	0.472	0.334
OBE1-2	0.359	0.360	0.419	0.421	0.385	0.386	0.334	0.383	0.377	0.380	0.396	0.396	0.407	0.387	0.363	0.326	0.322	0.354	0.399	0.353	0.380	0.331
OBE2-1	0.333	0.334	0.389	0.391	0.375	0.487	0.405	0.372	0.380	0.379	0.370	0.371	0.378	0.365	0.347	0.340	0.345	0.376	0.371	0.432	0.478	0.398
OBE2-2	0.409	0.410	0.454	0.453	0.418	0.423	0.406	0.417	0.404	0.407	0.447	0.446	0.449	0.433	0.410	0.332	0.362	0.357	0.426	0.376	0.416	0.402
OBE3-1	0.406	0.403	0.412	0.415	0.399	0.496	0.480	0.399	0.420	0.427	0.410	0.411	0.413	0.408	0.400	0.413	0.443	0.433	0.419	0.465	0.492	0.475
OBE3-2	0.446	0.449	0.469	0.468	0.446	0.399	0.361	0.445	0.465	0.465	0.415	0.414	0.434	0.433	0.443	0.363	0.354	0.379	0.467	0.385	0.393	0.358
OBE4-1	0.332	0.334	0.441	0.441	0.409	0.418	0.374	0.409	0.365	0.361	0.395	0.396	0.408	0.405	0.363	0.315	0.339	0.331	0.396	0.369	0.409	0.370
OBE4-2	0.362	0.363	0.431	0.424	0.428	0.413	0.298	0.425	0.379	0.368	0.373	0.371	0.389	0.396	0.387	0.275	0.284	0.331	0.393	0.371	0.407	0.296
OBE5-1	0.329	0.327	0.380	0.380	0.330	0.342	0.296	0.332	0.349	0.348	0.322	0.325	0.331	0.331	0.328	0.251	0.260	0.268	0.361	0.288	0.335	0.294
OBE5-2	0.353	0.351	0.414	0.417	0.405	0.478	0.339	0.403	0.357	0.359	0.388	0.388	0.400	0.400	0.372	0.334	0.336	0.364	0.386	0.397	0.464	0.337
OBE6-1	0.412	0.416	0.437	0.435	0.408	0.376	0.347	0.407	0.426	0.416	0.374	0.372	0.394	0.393	0.406	0.336	0.329	0.360	0.409	0.339	0.366	0.342
OBE6-2	0.417	0.416	0.475	0.476	0.459	0.487	0.446	0.456	0.436	0.439	0.448	0.446	0.450	0.456	0.431	0.400	0.425	0.429	0.456	0.450	0.481	0.443
OBE7-1	0.366	0.364	0.428	0.427	0.395	0.431	0.412	0.394	0.458	0.455	0.372	0.372	0.397	0.380	0.369	0.387	0.400	0.428	0.441	0.412	0.423	0.410
OBE7-2	0.376	0.377	0.442	0.438	0.431	0.400	0.355	0.430	0.443	0.441	0.413	0.412	0.422	0.423	0.397	0.343	0.330	0.359	0.439	0.352	0.392	0.352
Average	0.375	0.376	0.426	0.426	0.406	0.430	0.371	0.404	0.401	0.400	0.390	0.390	0.400	0.399	0.385	0.336	0.346	0.364	0.409	0.385	0.422	0.367

U2

G1a	0.000	0.000	0.005	0.005	-0.006	0.165	0.000	-0.005	-0.006	-0.003	-0.007	-0.007	-0.001	-0.007	-0.002	0.000	0.000	0.066	0.002	0.114	0.155	0.000
G1b	-0.032	-0.031	-0.062	-0.062	-0.074	-0.056	-0.081	-0.075	-0.037	-0.037	-0.074	-0.073	-0.067	-0.074	-0.050	-0.054	-0.068	-0.040	-0.050	-0.046	-0.053	-0.079
G3	0.376	0.377	0.394	0.394	0.368	0.503	0.371	0.368	0.363	0.364	0.346	0.346	0.362	0.357	0.370	0.337	0.346	0.374	0.376	0.425	0.489	0.367

Deflection Limit Factor
L = 286 ft

G1a	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800
G1b	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200
G3	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800

Vertical Defl Lim	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)									
G1a	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135
G1b	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195
G3	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546

D/C

G1a	0.0%	0.0%	0.4%	0.4%	0.5%	14.5%	0.0%	0.4%	0.5%	0.3%	0.7%	0.6%	0.1%	0.6%	0.2%	0.0%	0.0%	5.8%	0.2%	10.0%	13.7%	0.0%	OK
G1b	1.5%	1.4%	2.8%	2.8%	3.4%	2.5%	3.7%	3.4%	1.7%	1.7%	3.4%	3.3%	3.1%	3.4%	2.3%	2.4%	3.1%	1.8%	2.3%	2.1%	2.4%	3.6%	OK
G3	10.6%	10.6%	11.1%	11.1%	10.4%	14.2%	10.5%	10.4%	10.2%	10.3%	9.8%	9.8%	10.2%	10.1%	10.4%	9.5%	9.8%	10.5%	10.6%	12.0%	13.8%	10.4%	OK

	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)													
Min of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B32	0.000	0.000	0.005	0.005	-0.006	0.165	0.000	-0.005	-0.006	-0.003	-0.007	-0.007	-0.001	-0.007	-0.002	0.000	0.000	0.066	0.002	0.114	0.155	0.000
G1b B32	-0.032	-0.031	-0.062	-0.062	-0.074	-0.056	-0.081	-0.075	-0.037	-0.037	-0.074	-0.073	-0.067	-0.074	-0.050	-0.054	-0.068	-0.040	-0.050	-0.046	-0.053	-0.079
G3 B32 minus O	0.001	0.001	-0.032	-0.032	-0.038	0.073	0.000	-0.036	-0.037	-0.035	-0.044	-0.043	-0.038	-0.041	-0.014	0.001	0.000	0.009	-0.033	0.040	0.067	0.000

Min of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
OBE1-1	-0.400	-0.400	-0.409	-0.410	-0.440	-0.450	-0.315	-0.439	-0.366	-0.368	-0.405	-0.405	-0.406	-0.427	-0.415	-0.330	-0.294	-0.357	-0.388	-0.406	-0.443	-0.311
OBE1-2	-0.368	-0.369	-0.433	-0.436	-0.376	-0.426	-0.344	-0.373	-0.408	-0.413	-0.397	-0.398	-0.415	-0.383	-0.365	-0.352	-0.347	-0.345	-0.422	-0.364	-0.418	-0.343
OBE2-1	-0.368	-0.367	-0.436	-0.440	-0.407	-0.418	-0.348	-0.404	-0.381	-0.387	-0.399	-0.400	-0.418	-0.399	-0.380	-0.332	-0.321	-0.336	-0.410	-0.352	-0.407	-0.344
OBE2-2	-0.404	-0.409	-0.537	-0.535	-0.452	-0.453	-0.434	-0.450	-0.458	-0.452	-0.435	-0.435	-0.474	-0.445	-0.421	-0.352	-0.399	-0.406	-0.493	-0.425	-0.447	-0.431
OBE3-1	-0.322	-0.325	-0.297	-0.303	-0.331	-0.351	-0.299	-0.330	-0.304	-0.312	-0.298	-0.298	-0.299	-0.316	-0.324	-0.268	-0.279	-0.266	-0.304	-0.298	-0.343	-0.295
OBE3-2	-0.401	-0.402	-0.457	-0.455	-0.427	-0.382	-0.362	-0.425	-0.429	-0.424	-0.402	-0.400	-0.425	-0.417	-0.404	-0.352	-0.341	-0.360	-0.439	-0.365	-0.377	-0.360
OBE4-1	-0.396	-0.399	-0.428	-0.429	-0.406	-0.367	-0.377	-0.407	-0.361	-0.362	-0.424	-0.424	-0.417	-0.414	-0.395	-0.341	-0.348	-0.310	-0.379	-0.327	-0.361	-0.373
OBE4-2	-0.372	-0.371	-0.468	-0.467	-0.391	-0.412	-0.305	-0.389	-0.383	-0.385	-0.433	-0.432	-0.449	-0.412	-0.376	-0.332	-0.311	-0.322	-0.427	-0.365	-0.403	-0.300
OBE5-1	-0.327	-0.325	-0.413	-0.413	-0.334	-0.436	-0.347	-0.334	-0.375	-0.374	-0.349	-0.349	-0.378	-0.336	-0.328	-0.285	-0.310	-0.319	-0.393	-0.379	-0.428	-0.343
OBE5-2	-0.362	-0.360	-0.445	-0.445	-0.414	-0.503	-0.353	-0.411	-0.389	-0.388	-0.410	-0.410	-0.422	-0.414	-0.380	-0.346	-0.339	-0.330	-0.415	-0.394	-0.487	-0.349
OBE6-1	-0.409	-0.414	-0.462	-0.455	-0.432	-0.342	-0.356	-0.430	-0.465	-0.452	-0.406	-0.403	-0.427	-0.420	-0.414	-0.336	-0.308	-0.353	-0.455	-0.318	-0.332	-0.349
OBE6-2	-0.363	-0.362	-0.391	-0.389	-0.399	-0.410	-0.303	-0.397	-0.313	-0.314	-0.409	-0.407	-0.399	-0.406	-0.374	-0.267	-0.267	-0.319	-0.350	-0.358	-0.401	-0.300
OBE7-1	-0.369	-0.366	-0.436	-0.439	-0.418	-0.467	-0.428	-0.416	-0.398	-0.394	-0.388	-0.389	-0.397	-0.408	-0.387	-0.363	-0.397	-0.407	-0.413	-0.412	-0.456	-0.422
OBE7-2	-0.366	-0.367	-0.436	-0.436	-0.386	-0.434	-0.432	-0.384	-0.410	-0.406	-0.391	-0.390	-0.412	-0.383	-0.371	-0.352	-0.395	-0.390	-0.415	-0.409	-0.427	-0.426
Average	-0.373	-0.374	-0.432	-0.432	-0.401	-0.418	-0.357	-0.399	-0.389	-0.388	-0.396	-0.396	-0.410	-0.398	-0.381	-0.329	-0.333	-0.344	-0.407	-0.369	-0.409	-0.353

U2

G1a	0.000	0.000	0.005	0.005	-0.006	0.165	0.000	-0.005	-0.006	-0.003	-0.007	-0.007	-0.001	-0.007	-0.002	0.000	0.000	0.066	0.002	0.114	0.155	0.000
G1b	-0.032	-0.031	-0.062	-0.062	-0.074	-0.056	-0.081	-0.075	-0.037	-0.037	-0.074	-0.073	-0.067	-0.074	-0.050	-0.054	-0.068	-0.040	-0.050	-0.046	-0.053	-0.079
G3	-0.372	-0.373	-0.464	-0.464	-0.438	-0.345	-0.357	-0.436	-0.426	-0.423	-0.440	-0.439	-0.448	-0.440	-0.395	-0.328	-0.332	-0.335	-0.440	-0.329	-0.343	-0.353

Deflection Limit Factor
L = 286 ft

G1a	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800
G1b	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200
G3	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800

Vertical Defl Lim	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)									
G1a	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135
G1b	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195
G3	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546

D/C

G1a	0.0%	0.0%	0.4%	0.4%	0.5%	14.5%	0.0%	0.4%	0.5%	0.3%	0.7%	0.6%	0.1%	0.6%	0.2%	0.0%	0.0%	5.8%	0.2%	10.0%	13.7%	0.0%	OK
G1b	1.5%	1.4%	2.8%	2.8%	3.4%	2.5%	3.7%	3.4%	1.7%	1.7%	3.4%	3.3%	3.1%	3.4%	2.3%	2.4%	3.1%	1.8%	2.3%	2.1%	2.4%	3.6%	OK
G3	10.5%	10.5%	13.1%	13.1%	12.4%	9.7%	10.1%	12.3%	12.0%	11.9%	12.4%	12.4%	12.6%	12.4%	11.1%	9.3%	9.4%	9.4%	12.4%	9.3%	9.7%	10.0%	OK

Check Rotation about Transverse Axis Deflection Limits: TM 2.10.10 Section 6.9.8

	(rad)	(rad)						
Max of R3	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B32	-0.000354	0.00003	0.000069	0.00013	-5.2E-05	2.1E-05	3.5E-07	1E-07
G1b B32	-0.000583	-0.000551	0.000153	0.00017	-1.2E-07	7.2E-05	0.00011	4E-05
G3 B32 minus O	-0.000341	-0.000042	0.00007	0.00013	-6.2E-05	1.8E-05	7.7E-07	3E-07

Seismic

Max	0.000382429	0.000555	0.000423	0.00044	0.00014	0.00022	0.0005	0.0003
Min	-0.000376571	-0.000556	-0.000428	-0.0004	-0.00014	-0.0002	-0.0005	-0.0003

Total

G1a	-4.E-04	3.E-05	7.E-05	1.E-04	-5.E-05	2.E-05	3.E-07	1.E-07
G1b	-6.E-04	-6.E-04	2.E-04	2.E-04	-1.E-07	7.E-05	1.E-04	4.E-05
G2	-3.E-04	-4.E-05	7.E-05	1.E-04	-6.E-05	2.E-05	8.E-07	3.E-07
G3 (max)	4.E-05	5.E-04	5.E-04	6.E-04	8.E-05	2.E-04	5.E-04	3.E-04
G3 (min)	-7.E-04	-6.E-04	-4.E-04	-3.E-04	-2.E-04	-2.E-04	-5.E-04	-3.E-04

Defl Limits

G1a	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012
G1b	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
G2	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026
G3	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026

G1a	29.5%	2.5%	5.8%	11.2%	4.3%	1.8%	0.0%	0.0%	OK
G1b	34.3%	32.4%	9.0%	10.2%	0.0%	4.2%	6.4%	2.2%	OK
G2	13.1%	1.6%	2.7%	5.0%	2.4%	0.7%	0.0%	0.0%	OK
G3	27.6%	23.0%	19.0%	21.9%	7.7%	9.1%	19.1%	12.4%	OK

Check Relative Displacement of Longitudinal Deflection Limits: TM 2.10.10 Section 6.9.8

Group

Max of U1	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B32	0.04406	0.002483	0.003289	0.00444	0.00134	-0.0007	0.00014	0.0001
G1b B32	0.045047	0.057744	0.003012	0.00261	-0.00185	-0.0004	-0.0032	-0.0001
G3 B32 minus O	0.038973	0.008638	0.00279	0.00353	-0.00117	-0.0007	0.00029	0.0002

Seismic

Max	0.0943855	0.102441	0.06202	0.05625	0.0351	0.03519	0.111	0.1057
Min	-0.092673786	-0.102119	-0.062151	-0.0564	-0.0358	-0.035	-0.1107	-0.106

Total

G1a	0.04406	0.002483	0.003289	0.00444	0.00134	-0.0007	0.00014	0.0001
G1b	0.045047	0.057744	0.003012	0.00261	-0.00185	-0.0004	-0.0032	-0.0001
G3 (max)	0.1333585	0.111079	0.06481	0.05978	0.03393	0.03449	0.11129	0.106
G3 (min)	-0.053700786	-0.093481	-0.059361	-0.0529	-0.03697	-0.0357	-0.1104	-0.1057

Defl Limits

G1a	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300
G1b	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300
G3	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700

G1a	13.4%	0.8%	1.0%	1.3%	0.4%	0.2%	0.0%	0.0%	OK
G1b	13.7%	17.5%	0.9%	0.8%	0.6%	0.1%	1.0%	0.0%	OK
G3	19.9%	16.6%	9.7%	8.9%	5.5%	5.3%	16.6%	15.8%	OK

Check Rotation about Vertical Axis Deflection Limits: TM 2.10.10 Section 6.9.9

	(rad)	(rad)	(rad)	(rad)	(rad)	(rad)		
Max of R2	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B32	-0.000142	-0.000103	0.000013	9.8E-06	-2.9E-06	-1E-06	-2E-07	-1E-07
G1b B32	0.000033	0.000094	4.61E-06	-4E-06	-2.1E-05	-1E-05	-4E-05	-2E-05
G3 B32 minus O	-0.000106	-0.000071	0.000011	8E-06	-1.4E-05	-1E-05	-3E-07	-3E-07

Seismic

Max	2E-04	3E-04	6E-05	7E-05	5E-05	5E-05	2E-04	1E-04
Min	-3E-04	-3E-04	-6E-05	-7E-05	-5E-05	-5E-05	-2E-04	-1E-04

Total

G1a	-1.E-04	-1.E-04	1.E-05	1.E-05	-3.E-06	-1.E-06	-2.E-07	-1.E-07
G1b	3.E-05	9.E-05	5.E-06	-4.E-06	-2.E-05	-1.E-05	-4.E-05	-2.E-05
G3 (max)	1.E-04	2.E-04	7.E-05	8.E-05	4.E-05	4.E-05	2.E-04	1.E-04
G3 (min)	-4.E-04	-4.E-04	-5.E-05	-6.E-05	-7.E-05	-6.E-05	-2.E-04	-1.E-04

Defl Limits

G1a	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
G1b	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
G3	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021

G1a	20.3%	14.7%	1.9%	1.4%	0.4%	0.2%	0.0%	0.0%	OK
G1b	3.3%	9.4%	0.5%	0.4%	2.1%	1.1%	3.5%	1.8%	OK
G3	17.0%	16.8%	3.5%	3.6%	3.2%	2.8%	10.5%	6.4%	OK

Check Deck Twist: TM 2.10.10 Section 6.9.10

Total	rads per 10ft
G1a	7.441E-04
G1b	1.666E-04
G2	4.949E-04
G3 max	1.400E-03
G3 min	5.661E-05

Limits

Gauge 4.75 ft

	rads/10ft	in/10ft
G1a	0.0011	0.06
G1b	0.0011	0.06
G2	0.0030	0.17
G3	0.0030	0.17

D/C

G1a	70.7%	OK
G1b	15.8%	OK
G2	16.6%	OK
G3	46.9%	OK

Check Relative Longitudinal Displacement at Expansion Joint: TM 2.10.10 Section 6.10.3

Rotation

Group

Max of R3	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B32	-0.000354	-0.00055	0.000062	0.00024	0.00022	0.00023	-2E-05	0.0006
G4-2 B32	-0.001113	-0.000535	0.000209	5.6E-05	-0.00033	-0.0002	2.3E-05	-0.0006
G5-1 B32 minus	-0.000231	0.000104	-0.000213	-0.0001	-0.00015	-0.0001	-1E-04	0.0002
G5-2 B32 minus	-0.00055	0.000258	0.000338	0.00031	-7.2E-05	0.00012	9.5E-05	-0.0002

Seismic

Max	4.E-04	6.E-04	4.E-04	4.E-04	1.E-04	2.E-04	5.E-04	3.E-04
Min	-4.E-04	-6.E-04	-4.E-04	-4.E-04	-1.E-04	-2.E-04	-5.E-04	-3.E-04

Total

G4-1	-4.E-04	-6.E-04	6.E-05	2.E-04	2.E-04	2.E-04	-2.E-05	6.E-04
G4-2	-1.E-03	-5.E-04	2.E-04	6.E-05	-3.E-04	-2.E-04	2.E-05	-6.E-04
G5-1 (max)	2.E-04	7.E-04	2.E-04	3.E-04	-1.E-05	9.E-05	4.E-04	5.E-04
G5-1 (min)	-6.E-04	-5.E-04	-6.E-04	-6.E-04	-3.E-04	-3.E-04	-6.E-04	-9.E-05
G5-2 (max)	-2.E-04	8.E-04	8.E-04	7.E-04	7.E-05	3.E-04	6.E-04	1.E-04
G5-2 (min)	-9.E-04	-3.E-04	-9.E-05	-1.E-04	-2.E-04	-1.E-04	-4.E-04	-5.E-04

Distance to rails 30.0 in

Equivalent deflection

G4-1	-1.E-02	-2.E-02	2.E-03	7.E-03	7.E-03	7.E-03	-7.E-04	2.E-02
G4-2	-3.E-02	-2.E-02	6.E-03	2.E-03	-1.E-02	-6.E-03	7.E-04	-2.E-02
G5-1 (max)	5.E-03	2.E-02	6.E-03	9.E-03	-3.E-04	3.E-03	1.E-02	2.E-02
G5-1 (min)	-2.E-02	-1.E-02	-2.E-02	-2.E-02	-9.E-03	-1.E-02	-2.E-02	-3.E-03
G5-2 (max)	-5.E-03	2.E-02	2.E-02	2.E-02	2.E-03	1.E-02	2.E-02	3.E-03
G5-2 (min)	-3.E-02	-9.E-03	-3.E-03	-4.E-03	-6.E-03	-3.E-03	-1.E-02	-2.E-02

Deflection

Group

Max of U1	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B32	-0.029231	-0.008447	-0.389898	-0.3905	-0.35302	-0.3474	-0.2655	-0.2924
G4-2 B32	0.376282	0.355034	0.390017	0.39352	0.47068	0.4627	0.26547	0.2925
G5-1 B32 minus	0.029744	-0.001723	-0.176108	-0.1749	-0.15604	-0.1551	-0.1288	-0.1436
G5-2 B32 minus	0.222372	0.164967	0.189519	0.19278	0.23458	0.22431	0.13079	0.1456

Seismic

Max	0.0943855	0.102441	0.06202	0.05625	0.0351	0.03519	0.111	0.1057
Min	-0.092673786	-0.102119	-0.062151	-0.0564	-0.0358	-0.035	-0.1107	-0.106

Total

G4-1	-3.E-02	-8.E-03	-4.E-01	-4.E-01	-4.E-01	-3.E-01	-3.E-01	-3.E-01
G4-2	4.E-01	4.E-01	4.E-01	4.E-01	5.E-01	5.E-01	3.E-01	3.E-01
G5-1 (max)	1.E-01	1.E-01	-1.E-01	-1.E-01	-1.E-01	-1.E-01	-2.E-02	-4.E-02
G5-1 (min)	-6.E-02	-1.E-01	-2.E-01	-2.E-01	-2.E-01	-2.E-01	-2.E-01	-2.E-01
G5-2 (max)	3.E-01	3.E-01	3.E-01	2.E-01	3.E-01	3.E-01	2.E-01	3.E-01
G5-2 (min)	1.E-01	6.E-02	1.E-01	1.E-01	2.E-01	2.E-01	2.E-02	4.E-02

Defl Limits

L (ft)	319	319	330	330	330	330	322	322
ΔT (°F)	40	40	40	40	40	40	40	40
α	0.000006	0.000006	0.000006	6E-06	6E-06	6E-06	6E-06	6E-06
δTD (in)	0.91872	0.91872	0.9504	0.9504	0.9504	0.9504	0.92736	0.9274

G4	1.9187	1.9187	1.9504	1.9504	1.9504	1.9504	1.9274	1.9274
G5	2.7894	2.7894	2.8052	2.8052	2.8052	2.8052	2.7937	2.7937

D/C

G4	19.6%	18.5%	20.0%	20.2%	24.1%	23.7%	13.8%	15.2%	OK
G5	11.4%	9.6%	9.0%	8.9%	9.6%	9.3%	8.7%	9.0%	OK

Check Relative Vertical Displacement at Expansion Joint: TM 2.10.10 Section 6.10.4

Group

Max of U2	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B32	-0.05169	-0.101398	-0.032579	-0.0378	0.06205	0.07745	-0.0091	0.0106
G4-2 B32	-0.010608	-0.125988	-0.023634	-0.0373	0.06778	0.09155	0.00845	-0.0122
G5-1 B32 minus	-0.1545	-0.036855	-0.02729	-0.0331	0.02485	0.02419	-0.0098	0.003
G5-2 B32 minus	-0.136142	-0.061738	-0.020483	-0.0324	0.03174	0.03761	0.00951	-0.0037

Seismic

Max	0.1387	0.0593	0.0611	0.0548	0.0526	0.0358	0.0346	0.1208
Min	-0.1360	-0.0603	-0.0578	-0.0516	-0.0499	-0.0342	-0.0358	-0.1214

Total

G4-1	-5.E-02	-1.E-01	-3.E-02	-4.E-02	6.E-02	8.E-02	-9.E-03	1.E-02
G4-2	-1.E-02	-1.E-01	-2.E-02	-4.E-02	7.E-02	9.E-02	8.E-03	-1.E-02
G5-1 (max)	-2.E-02	2.E-02	3.E-02	2.E-02	8.E-02	6.E-02	2.E-02	1.E-01
G5-1 (min)	-3.E-01	-1.E-01	-9.E-02	-8.E-02	-3.E-02	-1.E-02	-5.E-02	-1.E-01
G5-2 (max)	3.E-03	-2.E-03	4.E-02	2.E-02	8.E-02	7.E-02	4.E-02	1.E-01
G5-2 (min)	-3.E-01	-1.E-01	-8.E-02	-8.E-02	-2.E-02	3.E-03	-3.E-02	-1.E-01

Defl Limits

G4	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
G5	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

D/C

G4	20.7%	50.4%	13.0%	15.1%	27.1%	36.6%	3.6%	4.9%	OK
G5	58.1%	24.4%	17.0%	16.9%	16.9%	14.7%	9.1%	25.0%	OK

Check Relative Transverse Displacement at Expansion Joint: TM 2.10.10 Section 6.10.5

Group

Max of U3	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B32	0.002374	-0.002162	0.00007	-9E-05	-0.00024	8.2E-05	-0.0002	0.0005
G4-2 B32	-0.003623	0.003641	-0.00006	0.00002	6.3E-06	0.00012	0.00024	-0.0005
G5-1 B32 minus	0.001322	-0.000773	0.000049	-4E-05	-9.8E-05	5.3E-05	-0.0001	0.0003
G5-2 B32 minus	-0.001659	0.002087	-0.00002	2.7E-05	0.00003	5.9E-05	0.00012	-0.0003

Seismic

Max	0.000386286	0.001012	0.000102	0.00022	0.00017	0.00016	0.00034	0.0004
Min	-0.000383786	-0.001013	-0.000104	-0.0002	-0.00017	-0.0002	-0.0003	-0.0004

Total

G4-1	2.E-03	-2.E-03	7.E-05	-9.E-05	-2.E-04	8.E-05	-2.E-04	5.E-04
G4-2	-4.E-03	4.E-03	-6.E-05	2.E-05	6.E-06	1.E-04	2.E-04	-5.E-04
G5-1 (max)	2.E-03	2.E-04	2.E-04	2.E-04	7.E-05	2.E-04	2.E-04	7.E-04
G5-1 (min)	9.E-04	-2.E-03	-5.E-05	-2.E-04	-3.E-04	-1.E-04	-4.E-04	-2.E-04
G5-2 (max)	-1.E-03	3.E-03	8.E-05	2.E-04	2.E-04	2.E-04	5.E-04	2.E-04
G5-2 (min)	-2.E-03	1.E-03	-1.E-04	-2.E-04	-1.E-04	-1.E-04	-2.E-04	-7.E-04

Defl Limits

G4	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800
G5	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600

D/C

G4	4.5%	4.6%	0.1%	0.1%	0.3%	0.1%	0.3%	0.7%	OK
G5	1.3%	1.9%	0.1%	0.2%	0.2%	0.1%	0.3%	0.4%	OK

Track-Structure Interaction and Serviceability: Displacement Analysis

Conejo Crossover: B42 live load scenario

Model for B1 Conejo Disp B42.sdb

Seismic Joint and Mid-span Displacements

C1 Dowel 1	247
C1 Midspan 1	9754
C1 Midspan 2	9727
C1 Midspan 3	9602
C1 Dowel 2	199
C2 Dowel 2	227
C2 Midspan	9252
C2 Dowel 3	228
C3 Dowel 3	258
C3 Midspan 1	9442
C3 Midspan 2	9541
C3 Midspan 3	9783
C3 Dowel 4	253

Expansion Joints

Viaduct/C1 T1	2
Viaduct/C1 T2	1
C1/C2 T1	4
C1/C2 T2	3
C2/C3 T1	5
C2/C3 T2	6
C3/Viaduct T1	1138
C3/Viaduct T2	1137

Max

	ksi	max allov	D/C
G4-1 B11	4.1	14.0	30%
G4-2 B11	3.3	14.0	23%
G5-1 B11	4.1	23.0	18%
G5-2 B11	6.0	23.0	26%
			OK

Min

	ksi	max allov	D/C
G4-1 B1	-3.8	14.0	-27%
G4-1 B2	-4.6	14.0	-33%
G5-1 B1	-1.6	23.0	-7%
G5-2 B1	-2.3	23.0	-10%
			OK

Check Vertical Deflection Limits: TM 2.10.10 Section 6.9.4 - 6.9.5

	(ft)	(ft)	(ft)	(ft)	(ft)																	
Max of U3	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B42	-0.066	-0.063	-0.102	-0.122	-0.084	-0.104	-0.039	-0.088	-0.155	-0.153	-0.117	-0.118	-0.106	-0.090	-0.056	-0.069	-0.069	-0.145	-0.112	-0.151	-0.145	-0.047
G1b B42	-0.198	-0.198	-0.160	-0.184	-0.223	-0.153	-0.146	-0.223	-0.231	-0.219	-0.215	-0.231	-0.181	-0.197	-0.165	-0.219	-0.224	-0.213	-0.168	-0.222	-0.205	-0.194

Deflection Limit Factor
L = 100 ft

G1a	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
G1b	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400

Vertical Defl Limits	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)
G1a	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343
G1b	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500

D/C

G1a	19.3%	18.4%	29.7%	35.6%	24.6%	30.4%	11.4%	25.6%	45.3%	44.5%	34.1%	34.5%	30.9%	26.3%	16.4%	20.1%	20.0%	42.3%	32.8%	44.1%	42.4%	13.8%	OK
G1b	39.7%	39.6%	31.9%	36.8%	44.6%	30.6%	29.1%	44.7%	46.3%	43.8%	43.1%	46.3%	36.2%	39.5%	33.1%	43.7%	44.7%	42.6%	33.7%	44.4%	41.0%	38.8%	OK

Check Transverse Deflection Limits: TM 2.10.10 Section 6.9.7

	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)														
Max of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B42	-0.011	-0.011	0.006	0.005	-0.010	0.037	-0.013	-0.010	0.011	0.011	-0.007	-0.006	-0.001	-0.008	-0.010	-0.012	-0.013	0.022	0.009	0.029	0.035	-0.013
G1b B42	-0.090	-0.089	-0.021	-0.021	-0.088	0.015	-0.178	-0.087	-0.012	-0.012	-0.058	-0.057	-0.038	-0.075	-0.089	-0.130	-0.155	0.001	-0.016	0.009	0.015	-0.174
G3 B42 minus OBE	-0.048	-0.048	-0.032	-0.032	-0.047	0.023	-0.064	-0.047	-0.027	-0.027	-0.042	-0.042	-0.037	-0.045	-0.047	-0.055	-0.060	-0.005	-0.029	0.009	0.021	-0.063

Max of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
OBE1-1	0.351	0.351	0.355	0.357	0.357	0.498	0.440	0.357	0.403	0.403	0.323	0.323	0.326	0.342	0.345	0.337	0.394	0.439	0.378	0.460	0.491	0.435
OBE1-2	0.390	0.391	0.402	0.405	0.407	0.459	0.381	0.407	0.372	0.371	0.382	0.383	0.393	0.396	0.396	0.360	0.356	0.398	0.370	0.424	0.455	0.377
OBE2-1	0.383	0.386	0.381	0.381	0.384	0.513	0.444	0.385	0.382	0.381	0.337	0.338	0.355	0.361	0.383	0.372	0.411	0.439	0.380	0.479	0.508	0.439
OBE2-2	0.410	0.409	0.435	0.437	0.437	0.446	0.451	0.440	0.409	0.411	0.425	0.426	0.430	0.432	0.412	0.363	0.405	0.405	0.411	0.427	0.444	0.446
OBE3-1	0.420	0.415	0.410	0.415	0.406	0.521	0.515	0.403	0.407	0.414	0.406	0.407	0.411	0.408	0.412	0.447	0.484	0.448	0.411	0.486	0.516	0.512
OBE3-2	0.475	0.475	0.464	0.466	0.459	0.475	0.413	0.460	0.445	0.447	0.412	0.411	0.427	0.430	0.468	0.386	0.384	0.434	0.454	0.453	0.473	0.410
OBE4-1	0.382	0.382	0.416	0.418	0.418	0.503	0.411	0.419	0.420	0.418	0.357	0.358	0.375	0.390	0.398	0.347	0.368	0.410	0.397	0.457	0.498	0.407
OBE4-2	0.385	0.391	0.429	0.425	0.434	0.401	0.357	0.435	0.395	0.392	0.354	0.353	0.378	0.388	0.388	0.310	0.335	0.364	0.388	0.384	0.398	0.354
OBE5-1	0.354	0.358	0.354	0.354	0.340	0.446	0.342	0.342	0.390	0.387	0.315	0.316	0.314	0.318	0.347	0.289	0.300	0.397	0.370	0.422	0.442	0.339
OBE5-2	0.365	0.364	0.409	0.410	0.402	0.477	0.458	0.401	0.401	0.401	0.363	0.363	0.385	0.384	0.380	0.381	0.422	0.432	0.381	0.450	0.472	0.456
OBE6-1	0.403	0.407	0.428	0.428	0.430	0.403	0.350	0.429	0.378	0.378	0.375	0.374	0.388	0.397	0.408	0.344	0.335	0.387	0.402	0.395	0.401	0.346
OBE6-2	0.446	0.443	0.471	0.472	0.458	0.448	0.461	0.456	0.443	0.442	0.415	0.415	0.436	0.433	0.450	0.429	0.438	0.445	0.455	0.447	0.447	0.456
OBE7-1	0.432	0.431	0.421	0.421	0.408	0.449	0.450	0.406	0.426	0.424	0.372	0.371	0.394	0.390	0.419	0.435	0.438	0.427	0.421	0.428	0.445	0.447
OBE7-2	0.437	0.438	0.437	0.436	0.451	0.420	0.366	0.451	0.416	0.419	0.400	0.399	0.416	0.426	0.434	0.362	0.364	0.393	0.422	0.400	0.418	0.367
Average	0.402	0.403	0.415	0.416	0.414	0.461	0.417	0.414	0.406	0.406	0.374	0.374	0.388	0.392	0.403	0.369	0.388	0.416	0.403	0.436	0.458	0.414

U2

G1a	-0.011	-0.011	0.006	0.005	-0.010	0.037	-0.013	-0.010	0.011	0.011	-0.007	-0.006	-0.001	-0.008	-0.010	-0.012	-0.013	0.022	0.009	0.029	0.035	-0.013
G1b	-0.090	-0.089	-0.021	-0.021	-0.088	0.015	-0.178	-0.087	-0.012	-0.012	-0.058	-0.057	-0.038	-0.075	-0.089	-0.130	-0.155	0.001	-0.016	0.009	0.015	-0.174
G3	0.355	0.355	0.384	0.384	0.366	0.484	0.354	0.367	0.379	0.379	0.332	0.332	0.351	0.348	0.356	0.313	0.328	0.410	0.374	0.446	0.478	0.351

Deflection Limit Factor
L = 286 ft

G1a	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800
G1b	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200
G3	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800

Vertical Defl Limits	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)									
G1a	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135
G1b	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195
G3	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546

D/C

G1a	1.0%	1.0%	0.5%	0.5%	0.9%	3.2%	1.1%	0.9%	1.0%	1.0%	0.6%	0.5%	0.1%	0.7%	0.9%	1.1%	1.1%	2.0%	0.8%	2.6%	3.1%	1.1%	OK
G1b	4.1%	4.1%	0.9%	0.9%	4.0%	0.7%	8.1%	4.0%	0.5%	0.6%	2.6%	2.6%	1.7%	3.4%	4.0%	5.9%	7.1%	0.0%	0.7%	0.4%	0.7%	7.9%	OK
G3	10.0%	10.0%	10.8%	10.8%	10.3%	13.7%	10.0%	10.3%	10.7%	10.7%	9.4%	9.4%	9.9%	9.8%	10.0%	8.8%	9.3%	11.6%	10.5%	12.6%	13.5%	9.9%	OK

	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)													
Min of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
G1a B42	-0.011	-0.011	0.006	0.005	-0.010	0.037	-0.013	-0.010	0.011	0.011	-0.007	-0.006	-0.001	-0.008	-0.010	-0.012	-0.013	0.022	0.009	0.029	0.035	-0.013
G1b B42	-0.090	-0.089	-0.021	-0.021	-0.088	0.015	-0.178	-0.087	-0.012	-0.012	-0.058	-0.057	-0.038	-0.075	-0.089	-0.130	-0.155	0.001	-0.016	0.009	0.015	-0.174
G3 B42 minus OBE	-0.048	-0.048	-0.032	-0.032	-0.047	0.023	-0.064	-0.047	-0.027	-0.027	-0.042	-0.042	-0.037	-0.045	-0.047	-0.055	-0.060	-0.005	-0.029	0.009	0.021	-0.063

Min of U2	**Column Labels**																					
Row Labels	**10228**	**10229**	**199**	**227**	**228**	**247**	**253**	**258**	**5805**	**5806**	**8898**	**8899**	**9198**	**9315**	**9388**	**9505**	**9541**	**9548**	**9665**	**9727**	**9754**	**9783**
OBE1-1	-0.364	-0.364	-0.405	-0.408	-0.426	-0.554	-0.468	-0.426	-0.370	-0.370	-0.386	-0.386	-0.397	-0.408	-0.391	-0.388	-0.434	-0.437	-0.360	-0.499	-0.546	-0.464
OBE1-2	-0.432	-0.433	-0.415	-0.418	-0.411	-0.435	-0.413	-0.411	-0.390	-0.394	-0.386	-0.387	-0.401	-0.400	-0.421	-0.381	-0.365	-0.389	-0.403	-0.414	-0.433	-0.408
OBE2-1	-0.389	-0.386	-0.422	-0.426	-0.421	-0.466	-0.372	-0.420	-0.377	-0.377	-0.368	-0.369	-0.395	-0.398	-0.402	-0.340	-0.336	-0.404	-0.398	-0.426	-0.460	-0.366
OBE2-2	-0.462	-0.467	-0.511	-0.511	-0.507	-0.511	-0.488	-0.509	-0.446	-0.442	-0.417	-0.417	-0.456	-0.461	-0.482	-0.426	-0.456	-0.448	-0.474	-0.481	-0.507	-0.484
OBE3-1	-0.314	-0.309	-0.294	-0.301	-0.310	-0.348	-0.328	-0.311	-0.291	-0.298	-0.296	-0.296	-0.290	-0.303	-0.300	-0.252	-0.285	-0.301	-0.294	-0.318	-0.346	-0.325
OBE3-2	-0.428	-0.430	-0.450	-0.451	-0.458	-0.446	-0.385	-0.459	-0.403	-0.403	-0.392	-0.392	-0.419	-0.428	-0.441	-0.371	-0.377	-0.396	-0.425	-0.423	-0.444	-0.384
OBE4-1	-0.363	-0.364	-0.405	-0.408	-0.421	-0.499	-0.453	-0.422	-0.401	-0.399	-0.411	-0.411	-0.406	-0.417	-0.385	-0.357	-0.404	-0.424	-0.385	-0.463	-0.494	-0.449
OBE4-2	-0.402	-0.399	-0.451	-0.452	-0.453	-0.409	-0.366	-0.451	-0.387	-0.383	-0.412	-0.412	-0.431	-0.434	-0.423	-0.313	-0.330	-0.370	-0.406	-0.379	-0.404	-0.362
OBE5-1	-0.373	-0.375	-0.393	-0.394	-0.385	-0.458	-0.440	-0.386	-0.414	-0.410	-0.331	-0.331	-0.359	-0.359	-0.378	-0.329	-0.392	-0.434	-0.388	-0.445	-0.453	-0.436
OBE5-2	-0.399	-0.398	-0.430	-0.432	-0.427	-0.447	-0.397	-0.426	-0.404	-0.403	-0.383	-0.382	-0.399	-0.401	-0.400	-0.355	-0.367	-0.408	-0.412	-0.425	-0.444	-0.393
OBE6-1	-0.446	-0.452	-0.460	-0.457	-0.467	-0.366	-0.284	-0.469	-0.418	-0.410	-0.397	-0.396	-0.424	-0.433	-0.454	-0.330	-0.290	-0.351	-0.433	-0.352	-0.363	-0.279
OBE6-2	-0.328	-0.326	-0.375	-0.379	-0.397	-0.375	-0.379	-0.397	-0.333	-0.330	-0.371	-0.372	-0.375	-0.387	-0.347	-0.323	-0.349	-0.332	-0.336	-0.355	-0.372	-0.374
OBE7-1	-0.404	-0.398	-0.417	-0.420	-0.409	-0.463	-0.495	-0.408	-0.403	-0.409	-0.371	-0.371	-0.384	-0.390	-0.396	-0.439	-0.469	-0.419	-0.404	-0.441	-0.458	-0.489
OBE7-2	-0.401	-0.403	-0.434	-0.432	-0.433	-0.438	-0.450	-0.434	-0.384	-0.382	-0.372	-0.372	-0.396	-0.402	-0.413	-0.399	-0.419	-0.392	-0.399	-0.416	-0.436	-0.445
Average	-0.393	-0.393	-0.419	-0.421	-0.423	-0.444	-0.409	-0.423	-0.387	-0.386	-0.378	-0.378	-0.395	-0.401	-0.402	-0.357	-0.377	-0.393	-0.394	-0.417	-0.440	-0.404

U2

G1a	-0.011	-0.011	0.006	0.005	-0.010	0.037	-0.013	-0.010	0.011	0.011	-0.007	-0.006	-0.001	-0.008	-0.010	-0.012	-0.013	0.022	0.009	0.029	0.035	-0.013
G1b	-0.090	-0.089	-0.021	-0.021	-0.088	0.015	-0.178	-0.087	-0.012	-0.012	-0.058	-0.057	-0.038	-0.075	-0.089	-0.130	-0.155	0.001	-0.016	0.009	0.015	-0.174
G3	-0.441	-0.441	-0.450	-0.453	-0.470	-0.421	-0.472	-0.470	-0.414	-0.413	-0.420	-0.420	-0.432	-0.446	-0.449	-0.413	-0.437	-0.398	-0.423	-0.408	-0.419	-0.467

Deflection Limit Factor
L = 286 ft

G1a	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800	864800
G1b	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200	447200
G3	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800	276800

Vertical Defl Limits	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)									
G1a	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135
G1b	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195	2.195
G3	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546	3.546

D/C

G1a	1.0%	1.0%	0.5%	0.5%	0.9%	3.2%	1.1%	0.9%	1.0%	1.0%	0.6%	0.5%	0.1%	0.7%	0.9%	1.1%	1.1%	2.0%	0.8%	2.6%	3.1%	1.1%	OK
G1b	4.1%	4.1%	0.9%	0.9%	4.0%	0.7%	8.1%	4.0%	0.5%	0.6%	2.6%	2.6%	1.7%	3.4%	4.0%	5.9%	7.1%	0.0%	0.7%	0.4%	0.7%	7.9%	OK
G3	12.4%	12.4%	12.7%	12.8%	13.3%	11.9%	13.3%	13.3%	11.7%	11.7%	11.9%	11.8%	12.2%	12.6%	12.7%	11.6%	12.3%	11.2%	11.9%	11.5%	11.8%	13.2%	OK

Check Rotation about Transverse Axis Deflection Limits: TM 2.10.10 Section 6.9.8

	(rad)	(rad)						
Max of R3	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B42	-0.000177	2.8E-06	4.9E-05	0.00011	0.00008	0.00012	-0.0002	-0.0002
G1b B42	-0.000219	-0.0001	0.00012	0.00015	0.00022	0.00033	-0.0003	-0.0003
G3 B42 minus OBE	-0.000175	1.7E-06	5.5E-05	0.00011	8.5E-05	0.00013	-0.0001	-0.0002

Seismic

Max	0.000196929	0.00022	0.00021	0.00016	0.0002	0.00024	0.00052	0.00036
Min	-0.000204286	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0005	-0.0004

Total

G1a	-2.E-04	3.E-06	5.E-05	1.E-04	8.E-05	1.E-04	-2.E-04	-2.E-04
G1b	-2.E-04	-1.E-04	1.E-04	2.E-04	2.E-04	3.E-04	-3.E-04	-3.E-04
G2	-2.E-04	2.E-06	6.E-05	1.E-04	9.E-05	1.E-04	-1.E-04	-2.E-04
G3 (max)	2.E-05	2.E-04	3.E-04	3.E-04	3.E-04	4.E-04	4.E-04	2.E-04
G3 (min)	-4.E-04	-2.E-04	-2.E-04	-5.E-05	-1.E-04	-1.E-04	-6.E-04	-5.E-04

Defl Limits

G1a	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012
G1b	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
G2	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026
G3	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026

G1a	14.8%	0.2%	4.1%	8.8%	6.7%	10.0%	12.5%	15.8%	OK
G1b	12.9%	8.3%	6.8%	9.1%	13.1%	19.5%	14.9%	15.5%	OK
G2	6.7%	0.1%	2.1%	4.3%	3.3%	4.9%	4.5%	7.1%	OK
G3	14.6%	8.7%	10.3%	10.5%	11.1%	14.0%	24.3%	20.9%	OK

Check Relative Displacement of Longitudinal Deflection Limits: TM 2.10.10 Section 6.9.8

Group

Max of U1	Column Labels							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B42	0.000315	-0.0029	1.6E-05	0.00012	0.00141	0.00065	-0.001	0.00082
G1b B42	-0.001796	-0.0013	-0.0023	0.00059	0.00307	0.00433	-0.0083	0.00136
G3 B42 minus OBE	-0.000896	-0.0029	0.00048	0.00053	0.00169	0.00108	-0.0002	-0.0013

Seismic

Max	0.031238643	0.03065	0.02673	0.02164	0.03197	0.02728	0.09455	0.08659
Min	-0.031926786	-0.0309	-0.0268	-0.0217	-0.0313	-0.0275	-0.0935	-0.085

Total

G1a	0.000315	-0.0029	1.6E-05	0.00012	0.00141	0.00065	-0.001	0.00082
G1b	-0.001796	-0.0013	-0.0023	0.00059	0.00307	0.00433	-0.0083	0.00136
G3 (max)	0.030342643	0.02777	0.02722	0.02217	0.03366	0.02835	0.09437	0.08526
G3 (min)	-0.032822786	-0.0338	-0.0263	-0.0212	-0.0296	-0.0264	-0.0937	-0.0864

Defl Limits

G1a	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300
G1b	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300
G3	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700	0.6700

G1a	0.1%	0.9%	0.0%	0.0%	0.4%	0.2%	0.3%	0.2%	OK
G1b	0.5%	0.4%	0.7%	0.2%	0.9%	1.3%	2.5%	0.4%	OK
G3	4.9%	5.0%	4.1%	3.3%	5.0%	4.2%	14.1%	12.9%	OK

Check Rotation about Vertical Axis Deflection Limits: TM 2.10.10 Section 6.9.9

	(rad)	(rad)	(rad)	(rad)	(rad)	(rad)		
Max of R2	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G1a B42	2.899E-07	3.7E-05	8E-06	4.8E-06	-8E-06	4.9E-07	-3E-05	2.6E-05
G1b B42	-0.000012	4.9E-05	1.9E-05	1.1E-05	-3E-05	-9E-06	-0.0001	7.1E-05
G3 B42 minus OBE	0.000007041	4.2E-05	8.2E-06	4.8E-06	-8E-06	-7E-07	-7E-05	1.1E-05

Seismic

Max	2E-04	2E-04	6E-05	7E-05	7E-05	6E-05	2E-04	1E-04
Min	-2E-04	-2E-04	-6E-05	-7E-05	-7E-05	-6E-05	-2E-04	-1E-04

Total

G1a	3.E-07	4.E-05	8.E-06	5.E-06	-8.E-06	5.E-07	-3.E-05	3.E-05
G1b	-1.E-05	5.E-05	2.E-05	1.E-05	-3.E-05	-9.E-06	-1.E-04	7.E-05
G3 (max)	2.E-04	2.E-04	7.E-05	7.E-05	6.E-05	6.E-05	2.E-04	2.E-04
G3 (min)	-2.E-04	-1.E-04	-5.E-05	-6.E-05	-7.E-05	-6.E-05	-3.E-04	-1.E-04

Defl Limits

G1a	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
G1b	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
G3	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021

G1a	0.0%	5.3%	1.1%	0.7%	1.1%	0.1%	4.1%	3.7%	OK
G1b	1.2%	4.9%	1.9%	1.1%	2.8%	0.9%	10.8%	7.1%	OK
G3	8.4%	11.4%	3.3%	3.6%	3.5%	2.8%	14.1%	7.3%	OK

Check Deck Twist: TM 2.10.10 Section 6.9.10

Total	rads per 10ft
G1a	7.031E-05
G1b	2.565E-04
G2	8.582E-05
G3 max	8.726E-04
G3 min	5.661E-05

Limits

Gauge 4.75 ft

	rads/10ft	in/10ft
G1a	0.0011	0.06
G1b	0.0011	0.06
G2	0.0030	0.17
G3	0.0030	0.17

D/C

G1a	6.7%	OK
G1b	24.4%	OK
G2	2.9%	OK
G3	29.3%	OK

Check Relative Longitudinal Displacement at Expansion Joint: TM 2.10.10 Section 6.10.3

Rotation

Group

Max of R3	Column Labels							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B42	0.00008	-0.0003	6.5E-05	0.00024	0.00039	0.00045	-0.0007	3.3E-05
G4-2 B42	-0.000624	-7E-05	0.00021	6.2E-05	0.0001	0.00034	-0.0004	-0.0009
G5-1 B42 minus OBE	-0.000133	-0.0001	-0.0002	-0.0001	-9E-05	-0.0001	-0.0004	-0.0001
G5-2 B42 minus OBE	-0.000276	0.00019	0.00034	0.00031	0.00024	0.00045	4.9E-05	-0.0004

Seismic

Max	2.E-04	2.E-04	2.E-04	2.E-04	2.E-04	2.E-04	5.E-04	4.E-04
Min	-2.E-04	-2.E-04	-2.E-04	-2.E-04	-2.E-04	-2.E-04	-5.E-04	-4.E-04

Total

G4-1	8.E-05	-3.E-04	7.E-05	2.E-04	4.E-04	5.E-04	-7.E-04	3.E-05
G4-2	-6.E-04	-7.E-05	2.E-04	6.E-05	1.E-04	3.E-04	-4.E-04	-9.E-04
G5-1 (max)	6.E-05	9.E-05	6.E-06	4.E-05	1.E-04	1.E-04	8.E-05	2.E-04
G5-1 (min)	-3.E-04	-4.E-04	-4.E-04	-3.E-04	-3.E-04	-4.E-04	-1.E-03	-5.E-04
G5-2 (max)	-8.E-05	4.E-04	6.E-04	5.E-04	4.E-04	7.E-04	6.E-04	-1.E-05
G5-2 (min)	-5.E-04	-4.E-05	1.E-04	2.E-04	4.E-05	2.E-04	-5.E-04	-7.E-04

Distance to rails 30.0 in

Equivalent deflection

G4-1	2.E-03	-8.E-03	2.E-03	7.E-03	1.E-02	1.E-02	-2.E-02	1.E-03
G4-2	-2.E-02	-2.E-03	6.E-03	2.E-03	3.E-03	1.E-02	-1.E-02	-3.E-02
G5-1 (max)	2.E-03	3.E-03	2.E-04	1.E-03	4.E-03	4.E-03	3.E-03	7.E-03
G5-1 (min)	-1.E-02	-1.E-02	-1.E-02	-9.E-03	-9.E-03	-1.E-02	-3.E-02	-1.E-02
G5-2 (max)	-2.E-03	1.E-02	2.E-02	1.E-02	1.E-02	2.E-02	2.E-02	-4.E-04
G5-2 (min)	-1.E-02	-1.E-03	4.E-03	5.E-03	1.E-03	7.E-03	-1.E-02	-2.E-02

Deflection

Group

Max of U1	Column Labels							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B42	-0.161473	-0.1378	-0.394	-0.3953	-0.405	-0.3977	-0.2415	-0.2707
G4-2 B42	0.185675	0.16329	0.39071	0.39342	0.39788	0.38724	0.27433	0.30374
G5-1 B42 minus OBE	-0.073481	-0.0643	-0.186	-0.1866	-0.1883	-0.1818	-0.1	-0.1113
G5-2 B42 minus OBE	0.072138	0.05674	0.18337	0.18473	0.19158	0.18247	0.13292	0.15575

Seismic

Max	0.031238643	0.03065	0.02673	0.02164	0.03197	0.02728	0.09455	0.08659
Min	-0.031926786	-0.0309	-0.0268	-0.0217	-0.0313	-0.0275	-0.0935	-0.085

Total

G4-1	-2.E-01	-1.E-01	-4.E-01	-4.E-01	-4.E-01	-4.E-01	-2.E-01	-3.E-01
G4-2	2.E-01	2.E-01	4.E-01	4.E-01	4.E-01	4.E-01	3.E-01	3.E-01
G5-1 (max)	-4.E-02	-3.E-02	-2.E-01	-2.E-01	-2.E-01	-2.E-01	-5.E-03	-2.E-02
G5-1 (min)	-1.E-01	-1.E-01	-2.E-01	-2.E-01	-2.E-01	-2.E-01	-2.E-01	-2.E-01
G5-2 (max)	1.E-01	9.E-02	2.E-01	2.E-01	2.E-01	2.E-01	2.E-01	2.E-01
G5-2 (min)	4.E-02	3.E-02	2.E-01	2.E-01	2.E-01	2.E-01	4.E-02	7.E-02

Defl Limits

L (ft)	319	319	330	330	330	330	322	322
ΔT (°F)	40	40	40	40	40	40	40	40
α	0.000006	6E-06	6E-06	6E-06	6E-06	6E-06	6E-06	6E-06
δTD (in)	0.91872	0.91872	0.9504	0.9504	0.9504	0.9504	0.92736	0.92736

G4	1.9187	1.9187	1.9504	1.9504	1.9504	1.9504	1.9274	1.9274
G5	2.7894	2.7894	2.8052	2.8052	2.8052	2.8052	2.7937	2.7937

D/C

G4	9.7%	8.5%	20.2%	20.3%	20.8%	20.4%	14.2%	15.8%	OK
G5	3.8%	3.4%	7.6%	7.4%	8.0%	7.5%	8.1%	8.7%	OK

Check Relative Vertical Displacement at Expansion Joint: TM 2.10.10 Section 6.10.4

Group

Max of U2	**Column Labels**							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B42	-0.068511	-0.1039	-0.0313	-0.0368	-0.0182	-0.0079	0.09612	0.0706
G4-2 B42	-0.031827	-0.1432	-0.0221	-0.036	-0.0256	-0.0097	0.13503	0.05774
G5-1 B42 minus OBE	-0.054382	-0.0712	-0.0267	-0.0322	-0.0215	-0.0094	0.01372	0.01862
G5-2 B42 minus OBE	-0.049765	-0.1112	-0.0198	-0.0316	-0.0267	-0.0114	0.05295	0.02112

Seismic

Max	0.1217	0.0392	0.0657	0.0589	0.0622	0.0402	0.0382	0.1374
Min	-0.1222	-0.0393	-0.0623	-0.0555	-0.0592	-0.0380	-0.0386	-0.1358

Total

G4-1	-7.E-02	-1.E-01	-3.E-02	-4.E-02	-2.E-02	-8.E-03	1.E-01	7.E-02
G4-2	-3.E-02	-1.E-01	-2.E-02	-4.E-02	-3.E-02	-1.E-02	1.E-01	6.E-02
G5-1 (max)	7.E-02	-3.E-02	4.E-02	3.E-02	4.E-02	3.E-02	5.E-02	2.E-01
G5-1 (min)	-2.E-01	-1.E-01	-9.E-02	-9.E-02	-8.E-02	-5.E-02	-2.E-02	-1.E-01
G5-2 (max)	7.E-02	-7.E-02	5.E-02	3.E-02	4.E-02	3.E-02	9.E-02	2.E-01
G5-2 (min)	-2.E-01	-2.E-01	-8.E-02	-9.E-02	-9.E-02	-5.E-02	1.E-02	-1.E-01

Defl Limits

G4	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
G5	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

D/C

G4	27.4%	57.3%	12.5%	14.7%	10.2%	3.9%	54.0%	28.2%	OK
G5	35.3%	30.1%	17.8%	17.5%	17.2%	9.9%	18.2%	31.7%	OK

Check Relative Transverse Displacement at Expansion Joint: TM 2.10.10 Section 6.10.5

Group

Max of U3	Column Labels							
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**1137**	**1138**
G4-1 B42	0.002344	-0.0022	6.9E-05	-9E-05	-0.0001	1.8E-05	-0.0002	0.00047
G4-2 B42	-0.003617	0.00359	-6E-05	2.4E-05	0.00013	0.00005	0.00031	-0.0006
G5-1 B42 minus OBE	0.001211	-0.0009	3.7E-05	-6E-05	-6E-05	3.1E-05	-7E-05	0.00026
G5-2 B42 minus OBE	-0.001756	0.00193	-3E-05	1.1E-05	8.3E-05	3.4E-05	0.00016	-0.0003

Seismic

Max	0.000206929	0.00079	8.9E-05	0.00023	0.00016	0.00014	0.00035	0.00046
Min	-0.000213929	-0.0008	-9E-05	-0.0002	-0.0002	-0.0002	-0.0003	-0.0004

Total

G4-1	2.E-03	-2.E-03	7.E-05	-9.E-05	-1.E-04	2.E-05	-2.E-04	5.E-04
G4-2	-4.E-03	4.E-03	-6.E-05	2.E-05	1.E-04	5.E-05	3.E-04	-6.E-04
G5-1 (max)	1.E-03	-1.E-04	1.E-04	2.E-04	1.E-04	2.E-04	3.E-04	7.E-04
G5-1 (min)	1.E-03	-2.E-03	-5.E-05	-3.E-04	-2.E-04	-1.E-04	-4.E-04	-2.E-04
G5-2 (max)	-2.E-03	3.E-03	6.E-05	2.E-04	2.E-04	2.E-04	5.E-04	2.E-04
G5-2 (min)	-2.E-03	1.E-03	-1.E-04	-2.E-04	-8.E-05	-1.E-04	-2.E-04	-7.E-04

Defl Limits

G4	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800
G5	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600	0.1600

D/C

G4	4.5%	4.5%	0.1%	0.1%	0.2%	0.1%	0.4%	0.7%	OK
G5	1.2%	1.7%	0.1%	0.2%	0.2%	0.1%	0.3%	0.4%	OK

Preliminary Sizing Calculations

Conejo Crossover

INPUT - COLUMNS

Description	Coefficient	Units	References and Notes	Crossover	Viaduct
Max Span	s_{max}	ft		100	120
Bridge Width	w_b	ft		4	50
Column Diameter	D_C	ft		6	10
Column Area	Ag	in2		4072	11310
Diameter of Confined Column Concrete	D'	ft		5.26	9.26
Column Longitudinal Reinf Size		#		14	11
Number of Column Longitudinal Reinf				37	73
Column Longitudinal Reinf Ratio	ρ		2 HOOPS	0.020	0.010
Column Transverse Reinf Size		#		8	8
Column Transverse Reinf Spacing	s	in		4	4
Column Transverse Reinf Ratio	ρ_s		2 HOOPS	0.025	0.014
Crossover Column Clear Height	H_c	ft	Top of Shaft to Bottom Girder	26.50	26.50
"L" of crossover column	L	ft	Assuming Fixed-Fixed conditions (CSDC 3.1.3)	13.3	13.3
Depth of Pile Cap	D_{ftg}	ft		0.0	0.0
Spacing of Piles	s_p	ft		28.0	28.0

Reinforcing Steel Properties

Description	Coefficient	Units	References and Notes	Crossover	Viaduct
Modulus of Elasticity	E_s	ksi	(CSDC 3.2.3 per TM 2.10.4)	29000	29000
Spec. Min. Yield Strength	f_y	ksi	(CSDC 3.2.3 per TM 2.10.4)	60	60
Expected Min. Yield Strength	f_{ye}	ksi	(CSDC 3.2.3 per TM 2.10.4)	68	68
Spec. Min. Tensile Strength	f_u	ksi	(CSDC 3.2.3 per TM 2.10.4)	80	80
Expected Tensile Strength	f_{ue}	ksi	(CSDC 3.2.3 per TM 2.10.4)	95	95
Nominal Yield Strain	ε_y		(CSDC 3.2.3 per TM 2.10.4)	0.0021	0.0021
Expected Yield Strain	ε_{ye}		(CSDC 3.2.3 per TM 2.10.4)	0.0023	0.0023
Ultimate Tensile Strain ≤ #10 bar	ε_{su}		(CSDC 3.2.3 per TM 2.10.4)	0.12	0.12
Ultimate Tensile Strain ≥ #11 bar	ε_{su}		(CSDC 3.2.3 per TM 2.10.4)	0.09	0.09
Reduced Ult. Tensile Strain ≤ #10 bar	ε_{su}^R		(CSDC 3.2.3 per TM 2.10.4)	0.09	0.09
Reduced Ult. Tensile Strain ≥ #11 bar	ε_{su}^R		(CSDC 3.2.3 per TM 2.10.4)	0.06	0.06
Onset of Strain Hardening, #8 bar	ε_{sh}		(CSDC 3.2.3 per TM 2.10.4)	0.015	0.015
Onset of Strain Hardening, #9 bar	ε_{sh}		(CSDC 3.2.3 per TM 2.10.4)	0.0125	0.0125
Onset of Strain Hardening, #10/11 bar	ε_{sh}		(CSDC 3.2.3 per TM 2.10.4)	0.0115	0.0115
Onset of Strain Hardening, #14 bar	ε_{sh}		(CSDC 3.2.3 per TM 2.10.4)	0.0075	0.0075
Onset of Strain Hardening, #18 bar	ε_{sh}		(CSDC 3.2.3 per TM 2.10.4)	0.005	0.005

Concrete Properties (Column, Column Cap, Pile)

Description	Coefficient	Units	References and Notes	Crossover	Viaduct
Concrete Compressive Strength	f_c'	psi	Column, Column Cap and Pile	5000	5000
Concrete Compressive Strength		psi	Girder	6000	6000
Expected Concrete Comp. Strength	f_{ce}'	psi	(CSDC 3.2.6 per TM 2.10.4)	5000	5000
Weight of Concrete	w	pcf		155	155
Weight of Concrete for Ec	w	pcf	(CSDC 3.2.6 per TM 2.10.4)	144	144
Modulus of Elasticity	E_c	psi	(CSDC 3.2.6 per TM 2.10.4)	5.133E+06	5.133E+06
Shear Modulus	G_c		(CSDC 3.2.6 per TM 2.10.4)	2.14E+06	2.14E+06
Poisson's Ratio	v_c		(CSDC 3.2.6 per TM 2.10.4)	0.2	0.2
Unconfined Conc. Comp. Strain	ε_{c0}		(CSDC 3.2.6 per TM 2.10.4)	0.002	0.002
Ult. Unconfined Comp. Strain (spalling)	ε_{sp}		(CSDC 3.2.6 per TM 2.10.4)	0.005	0.005
Confined Compressive Strain	ε_{cc}		CSiBRIDGE Section Designer (CSDC 3.2.6 per TM 2.10.4)	0.0058	0.0058
Ult Compression Strain for Confined Conc.	ε_{cu}		CSiBRIDGE Section Designer (CSDC 3.2.6 per TM 2.10.4)	0.0085	0.0085

OUTPUT - COLUMNS

Column Plastic Hinge Length

Description	Coefficient	Units	References and Notes	Crossover	Viaduct
$Lp = .08 \times L + .15\ f_{ye} \times d_{bl}$		in	(CSDC 7.6.2 per TM 2.10.4)	29.99	27.10

Column Reinforcement - Longitudinal Reinforcement

Description	Coefficient	Units	References and Notes	Crossover	Viaduct
ρ				0.020	0.010
$0.01 \le \rho \le .04$			(CSDC 3.7)	**Long Reinf OK**	**Long Reinf OK**
Appx Rebar Spacing		in		5.36	4.78

Column Reinforcement - Transverse Reinforcement

Description	Coefficient	Units	References and Notes	Crossover	Viaduct
ρ_s				0.025	0.014
$\rho_s \ge .12 \times (f_c' / f_y)$			(AASHTO LRFD 5.10.11.4.1d, at hinge region)	**Transv Reinf OK**	**Transv Reinf OK**
$\rho_s \ge .45\ (A_g/A_c - 1) * (f_c' / f_y)$			(AASHTO LRFD 5.7.4.6)	**Transv Reinf OK**	**Transv Reinf OK**

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Column Strength Calculations (1)

Conejo Crossover: B11 live load senario

Strength 1

Loads from most onerous column, as identified by the SAP Section Design check

Description	Units	Reference	Crossover	Viaduct
CSiBridge Model			Conejo Force B11	Conejo Force B11
Axial	k	CSiBridge	1823.528	1747.48
Shear V2	k	CSiBridge	234.991	413.743
Moment M3	k-in	CSiBridge	44591.152	126805.112
Shear V3	k	CSiBridge	297.597	144.643
Moment M2	k-in	CSiBridge	52300.751	34352.581

Φ Flexure		(CSDC 3.2.1 per TM 2.10.4)	1.00	1.00
Φ Shear		(CSDC 3.2.1 per TM 2.10.4)	0.90	0.90

Column Shear Capacity

Description	Units	Reference	Crossover	Viaduct
A_e = .8 x A_g	in^2	(CSDC 3.6.2 per TM 2.10.4)	3257	9048
ρ_s x f_{yh}	ksi		1.50	0.85
ρ_s x f_{yh} ≤ .35	ksi		0.35	0.35
μ_d max			1.5	1.5
Factor 1 = ρ_s x f_{yh} / .15 ksi + 3.67 - μ_d			4.52	4.50
.3 ≤ Factor 1 ≤ 3			3.00	3.00
Factor 2 (Assume Pc=0 except B35)			1	2
v_c Inside Plastic Hinge Zone=Factor 1 x Factor 2 x fc' ^.5	psi		212	424
v_c Inside Plastic Hinge Zone ≤ 4 fc'^.5	psi		212	283
v_c Outisde Plastic Hinge Zone=3 x Factor 2 x fc' ^.5	psi		212	424
v_c Outisde Plastic Hinge Zone ≤ 4 fc'^.5	psi		212	283
V_c = v_c x A_e		(CSDC 3.6.2 per TM 2.10.4)		
V_c Inside PH Zone =	k		691	2559
V_c Outwide PH Zone =	k		691	2559
A_v = n x (п/2) x A_b	in^2	(CSDC 3.6.3 per TM 2.10.4) 2 hoops	2.48	42.73

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Min A_v = .025 x D' x s / f_{yh}	in^2	(CSDC 3.6.5 per TM 2.10.4)	0.11	0.19
			Min OK	**Min OK**
$V_s = A_v \times f_{yh} \times D' / s \leq 8 \times fc'$^.5 x A_e	k		1843	5118
$\Phi V_n = V_c + V_s$	k	(CSDC 3.6.1 per TM 2.10.4)		
ΦVn^{col} Inside PH Zone	k		2280	6910
ΦVn^{col} Outside PH Zone	k		2280	6910

Column Force Demand

Description	Units	Reference	Crossover	Viaduct
Extreme DL	k		2000	2000
M_p^{col} (Caltrans Idealized)	k-in	CSiBridge Section Design	194340	476606
$M_o^{col} = 1.2 \times M_p^{col}$	k-in	(CSDC Eq. 4.4 per TM 2.10.4)	194340	476606
$V_o^{col} = M_o^{col} / L$	k		611	1499
Vmax (SRSS)			379	438
ΦVn Inside PH Zone	k		2280	6910
ΦVn Outside PH Zone	k		2280	6910
$\Phi V_n^{col} \geq V_o^{col}$		(CSDC 3.6 per TM 2.10.4)	**Vn OK**	**Vn OK**
Axial DL	k	CSiBridge	1824	1747
Md = $\sqrt{(M2^2+M3^2)}$	k-in		68729	131376
Mn	k-in	CSiBridge	163619	373101
$\Phi M_n^{col} \geq M_o^{col}$		CSiBridge	**Mn OK**	**Mn OK**

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Column Strength Calculations (2)

Conejo Crossover: B11 live load senario

Summary

	kips	kips	kips	kip-in	kip-in	kips
Row Labels	**Max of P**	**Max of V2**	**Max of V3**	**Max of M2**	**Max of M3**	**Min of P**
B11 Strength 1-1 Max	-1019.568	234.991	227.151	44567.488	44591.152	-2104.622
B11 Strength 5	-713.972	275.568	326.681	56245.837	50506.687	-1921.707
B11 Strength 1-2 Max	-815.38	218.722	96.233	29209.266	40268.558	-2106.461
B11 Strength 1-1 Min	-696.555	225.551	205.409	39478.651	42244.097	-1602.948
B11 Strength 1-2 Min	-545.836	214.115	70.188	23817.982	39298.687	-1628.776

Max D/C
0.426

Strength 1: All Column Sections

OutputCase (All)

Str5 Identified as worst case by SAP section check

	Column Labels								
	Max of P	Max of V2	Max of V3	Max of M2	Max of M3	[M]	M	D/C	
Row Labels	0	0	0	0	0	kip-in	kip-in		
1260	-882.719	243.475	228.69	42351.767	47582.593	63700.67	156933.22	0.41	ok
1261	-908.682	249.016	231.677	24170.935	28226.331	37161.268	157595.38	0.24	ok
1262	-934.646	253.925	233.994	10699.119	8429.543	13620.879	158257.54	0.09	ok
1263	-960.609	258.102	235.633	14118.546	8860.19	16668.422	158919.70	0.10	ok
1264	-836.272	242.06	224.857	41682.528	47166.415	62945.245	155928.76	0.40	ok
1265	-862.235	247.605	227.914	23806.417	27922.614	36693.567	156590.92	0.23	ok
1266	-888.198	252.517	230.287	9584.01	8238.02	12637.967	157253.08	0.08	ok
1267	-914.161	256.697	231.965	13948.069	8789.017	16486.22	157915.24	0.10	ok
1268	-727.225	230.73	231.629	43206.149	43719.659	61466.901	158019.13	0.39	ok
1269	-753.188	236.02	235.013	24791.661	25376.632	35476.752	158681.30	0.22	ok
1270	-779.151	240.642	237.647	9544.529	6613.015	11611.632	159343.46	0.07	ok
1271	-805.115	244.527	239.516	14327.357	10139.869	17552.496	160005.62	0.11	ok
1272	-760.304	192.602	233.855	43170.274	36184.256	56329.148	157090.73	0.36	ok
1273	-786.267	197.156	237.341	24583.132	20872.368	32248.816	157752.89	0.20	ok
1274	-812.23	201.131	240.046	8846.113	5198.502	10260.514	158415.05	0.06	ok
1275	-838.193	204.472	241.96	14333.664	9320.556	17097.564	159077.21	0.11	ok
1276	-789.34	204	235.794	43576.91	39596.223	58879.606	154722.12	0.38	ok
1277	-815.303	208.715	239.34	24831.347	23378.248	34104.813	155384.28	0.22	ok
1278	-841.266	212.876	242.092	8365.988	6785.4	10771.788	156046.44	0.07	ok
1279	-867.229	216.404	244.039	14233.582	8686.219	16674.689	156708.60	0.11	ok
1280	-778.104	205.864	240.593	44731.935	40168.841	60120.561	154582.90	0.39	ok
1281	-804.067	210.637	244.238	25604.761	23802.636	34959.538	155245.06	0.23	ok
1282	-830.03	214.863	247.076	8317.657	7057.008	10908.014	155907.22	0.07	ok
1283	-855.993	218.457	249.092	14227.122	8357.068	16500.048	156569.38	0.11	ok
1284	-652.562	186.776	242.351	44935.706	34482.618	56641.58	154794.03	0.37	ok
1285	-678.525	191.337	246.168	25675.36	19633.918	32322.049	155456.19	0.21	ok
1286	-704.489	195.32	249.145	8318.192	4422.656	9420.8388	156118.37	0.06	ok
1287	-730.452	198.669	251.261	14663.933	8980.91	17195.571	156780.53	0.11	ok
1288	-784.465	156.104	210.358	39817.268	30834.315	50360.399	156034.53	0.32	ok
1289	-810.428	160.041	214.135	23097.806	18425.427	29546.658	156696.69	0.19	ok
1290	-836.392	163.52	217.083	6142.799	5704.215	8382.8425	157358.85	0.05	ok
1291	-862.355	166.47	219.185	13730.943	7599.992	15693.906	158021.01	0.10	ok
1292	-824.592	155.418	210.69	39824.786	30570.392	50205.203	156806.42	0.32	ok
1293	-850.555	159.313	214.448	23074.895	18215.318	29398.105	157468.58	0.19	ok
1294	-876.518	162.74	217.379	6152.822	5558.991	8292.1408	158130.74	0.05	ok
1295	-902.481	165.637	219.466	13829.134	7935.6	15944.237	158792.90	0.10	ok
1296	-844.905	154.147	213.016	40281.171	30074.438	50269.718	160530.09	0.31	ok
1297	-870.868	157.92	216.764	23346.433	17822.781	29371.882	161192.25	0.18	ok
1298	-896.831	161.206	219.686	6261.281	5289.968	8196.7921	161854.41	0.05	ok
1299	-922.794	163.958	221.764	13947.419	8830.721	16507.941	162129.62	0.10	ok
1300	-821.43	155.626	212.156	40555.455	29294.826	50029.309	160036.94	0.31	ok

1301	-847.393	159.922	215.78	23689.026	16922.547	29112.584	160699.10	0.18	ok
1302	-873.356	163.672	218.609	7933.374	4227.954	8989.6617	161361.26	0.06	ok
1303	-899.319	166.82	220.629	13814.494	9641.401	16846.271	161987.53	0.10	ok
1304	-870.384	169.889	202.111	38685.713	33433.497	51131.039	158068.99	0.32	ok
1305	-896.347	174.335	205.383	22691.311	19927.35	30199.253	158731.15	0.19	ok
1306	-922.31	178.252	207.921	7929.377	6067.729	9984.6059	159393.31	0.06	ok
1307	-948.273	181.567	209.719	13472.737	9378.413	16415.519	160055.47	0.10	ok
1308	-883.302	175.224	199.639	38199.236	34924.348	51758.011	158577.73	0.33	ok
1309	-909.265	179.74	202.721	22346.465	20994.067	30661.3	159239.89	0.19	ok
1310	-935.228	183.732	205.103	7933.772	6704.739	10387.409	159902.05	0.06	ok
1311	-961.191	187.121	206.781	13590.118	9273.477	16452.619	160564.21	0.10	ok
1312	-908.647	173.965	201.362	38574.207	34461.036	51725.549	159246.46	0.32	ok
1313	-934.61	178.494	204.342	22574.041	20630.798	30581.32	159908.62	0.19	ok
1314	-960.573	182.496	206.645	7904.975	6440.522	10196.517	160570.78	0.06	ok
1315	-986.537	185.89	208.266	14090.406	9281.846	16872.824	161232.94	0.10	ok
1316	-897.664	162.647	204.293	38781.264	31033.86	49669.779	158746.34	0.31	ok
1317	-923.627	167.128	207.216	22543.921	18103.389	28912.991	159408.50	0.18	ok
1318	-949.591	171.07	209.463	7986.107	4816.721	9326.2375	160070.66	0.06	ok
1319	-975.554	174.401	211.035	14812.692	9235.366	17455.882	160732.82	0.11	ok
1320	-798.017	151.558	108.578	13944.699	28770.144	31971.484	155122.52	0.21	ok
1321	-823.981	156.015	111.499	5317.165	16721.316	17546.357	155784.68	0.11	ok
1322	-849.944	159.949	113.755	261.644	4319.245	4327.1625	156446.84	0.03	ok
1323	-875.907	163.285	115.341	12462.07	7836.234	14721.065	157109.00	0.09	ok
1324	-800.25	162.473	103.944	13282.774	31985.308	34633.683	155405.99	0.22	ok
1325	-826.214	166.994	106.935	5019.234	19068.742	19718.256	156068.15	0.13	ok
1326	-852.177	171.001	109.25	-9.3	5795.546	5795.5535	156730.31	0.04	ok
1327	-878.14	174.41	110.883	11775.999	7986.41	14228.735	157392.47	0.09	ok
1328	-776.214	164.231	103.801	13357.251	32493.788	35132.071	154816.21	0.23	ok
1329	-802.177	168.754	106.888	5105.041	19437.432	20096.647	155478.37	0.13	ok
1330	-828.14	172.762	109.279	-49.556	6024.906	6025.1098	156140.53	0.04	ok
1331	-854.104	176.173	110.966	11378.701	8082.711	13957.258	156802.70	0.09	ok
1332	-706.723	146.286	118.688	16108.963	27135.081	31556.478	157057.59	0.20	ok
1333	-732.687	150.603	122.285	6673.265	15505.342	16880.406	157719.75	0.11	ok
1334	-758.65	154.375	125.08	-43.611	3536.372	3536.6409	158381.91	0.02	ok
1335	-784.613	157.546	127.06	11839.414	8612.966	14640.864	159044.07	0.09	ok
1336	-738.158	137.519	124.202	17177.381	26455.156	31542.633	157017.10	0.20	ok
1337	-764.121	141.109	127.938	7307.46	15522.393	17156.446	157679.26	0.11	ok
1338	-790.084	144.244	130.842	-330.849	4304.201	4316.8979	158341.42	0.03	ok
1339	-816.048	146.878	132.901	12120.03	8118.282	14587.722	159003.58	0.09	ok
1340	-725.743	140.286	123.617	17115.303	27331.275	32247.98	153476.14	0.21	ok
1341	-751.706	144.001	127.359	7290.683	16178.563	17745.421	154138.32	0.12	ok
1342	-777.669	147.278	130.269	-547.975	4730.503	4762.1356	154800.48	0.03	ok
1343	-803.632	150.057	132.332	12045.538	7321.136	14095.887	155462.64	0.09	ok
1344	-696.555	141.918	123.784	17230.492	27832.378	32734.25	152912.24	0.21	ok
1345	-722.518	145.675	127.546	7389.649	16549.899	18124.736	153574.40	0.12	ok
1346	-748.481	149	130.476	-747.532	4968.76	5024.6771	154236.56	0.03	ok
1347	-774.444	151.828	132.554	11972.468	7090.378	13914.505	154898.72	0.09	ok
1348	-1342.995	257.31	93.987	7110.148	49655.836	50162.299	163484.74	0.31	ok
1349	-1368.958	263.098	96.917	-332.34	29205.463	29207.354	163675.54	0.18	ok
1350	-1394.921	268.218	99.164	-6728.579	8307.052	10690.224	163866.33	0.07	ok
1351	-1420.884	272.565	100.731	11801.889	9881.197	15392.292	164057.13	0.09	ok
1352	-1256.729	255.09	92.121	6986.121	49090.092	49584.705	162967.62	0.30	ok
1353	-1282.693	260.881	95.101	-307.284	28811.577	28813.216	163158.41	0.18	ok
1355	-1308.656	266.012	97.387	-6502.699	8084.488	10375.165	163349.20	0.06	ok
1356	-1334.619	270.374	98.982	11632.172	9728.845	15164.361	163540.00	0.09	ok
1357	-1228.994	250.659	95.381	7825.464	47822.662	48458.693	162764.08	0.30	ok
1358	-1254.957	256.395	98.518	286.626	27899.042	27900.514	162954.87	0.17	ok
1359	-1280.92	261.452	100.93	-6470.511	7532.659	9930.1795	163145.66	0.06	ok
1360	-1306.883	265.737	102.618	11654.794	10050.704	15389.96	163336.46	0.09	ok
1361	-1188.918	245.69	98.954	8683.338	46340.847	47147.37	163516.07	0.29	ok
1362	-1214.881	251.256	102.308	816.509	26808.472	26820.903	163706.87	0.16	ok
1363	-1240.845	256.122	104.908	-6160.73	6862.717	9222.3359	163897.66	0.06	ok

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1364	-1266.808	260.214	106.748	11957.996	11156.498	16354.238	164088.45	0.10	ok
1365	-1161.503	202.341	107.634	10312.099	37361.301	38758.305	163235.04	0.24	ok
1366	-1197.287	207.164	111.067	1769.506	21276.596	21350.051	163425.84	0.13	ok
1367	-1233.081	211.369	113.716	-6453.562	4832.54	8062.3759	163616.63	0.05	ok
1368	-1268.888	214.895	115.576	12126.711	9785.334	15582.358	163807.43	0.10	ok
1369	-1202.168	215.287	114.498	11965.081	41265.943	42965.582	162526.14	0.26	ok
1370	-1228.131	220.257	118.002	2862.51	24152.603	24321.64	162716.94	0.15	ok
1371	-1254.095	224.645	120.709	-5932.903	6660.132	8919.4561	162907.73	0.05	ok
1372	-1280.058	228.359	122.614	12117.22	9139.998	15177.832	163098.53	0.09	ok
1373	-1193.728	217.056	120.465	13428.204	41857.914	43959.09	162493.40	0.27	ok
1374	-1219.691	222.062	124.053	3853.355	24603.641	24903.564	162684.20	0.15	ok
1375	-1245.654	226.487	126.831	-5603.089	6966.636	8940.281	162874.99	0.05	ok
1376	-1271.618	230.259	128.79	12125.141	8761.653	14959.465	163065.79	0.09	ok
1377	-1174.313	210.469	123.639	14159.248	39961.382	42395.712	162324.53	0.26	ok
1378	-1200.276	215.412	127.283	4349.518	23231.187	23634.855	162515.32	0.15	ok
1379	-1226.24	219.769	130.099	-5325.232	6127.657	8118.2681	162706.12	0.05	ok
1380	-1252.203	223.458	132.082	12381.303	8826.964	15205.655	162896.91	0.09	ok
1381	-1041.843	197.313	127.408	15021.672	36099.384	39100.079	162233.03	0.24	ok
1382	-1071.53	202.096	131.151	4898.528	20417.246	20996.655	162423.82	0.13	ok
1383	-1097.494	206.272	134.051	-5074.316	4381.498	6704.1933	162614.62	0.04	ok
1384	-1123.457	209.78	136.099	12600.04	9370.515	15702.47	162805.41	0.10	ok
1385	-1370.117	168.891	129.814	15817.418	30226.665	34115.128	164340.11	0.21	ok
1386	-1396.08	173.167	133.638	5497.2	16801.838	17678.263	164530.90	0.11	ok
1387	-1422.043	176.908	136.616	-5110.603	3036.466	5944.6101	164721.69	0.04	ok
1388	-1448.007	180.058	138.73	12260.281	7750.092	14504.427	164912.49	0.09	ok
1389	-774.287	159.588	107.534	14109.766	31101.964	34152.857	154592.72	0.22	ok
1390	-800.25	164.052	110.812	5560.801	18414.697	19235.997	155254.88	0.12	ok
1391	-826.213	167.991	113.355	-80.66	5376.151	5376.756	155917.04	0.03	ok
1392	-852.176	171.331	115.154	11370.239	8272.853	14061.381	156579.20	0.09	ok
1393	-823.777	237.668	229.05	42751.891	45841.915	62683.374	155556.65	0.40	ok
1395	-849.74	243.138	232.266	24547.722	26947.305	36451.994	156218.82	0.23	ok
1396	-875.704	247.965	234.77	9310.461	7617.813	12029.786	156880.98	0.08	ok
1397	-901.667	252.059	236.545	13989.651	9133.774	16707.369	157543.14	0.11	ok
1398	-780.676	199.728	239.416	44307.849	38348.905	58598.84	154466.64	0.38	ok
1399	-806.639	204.446	243.13	25274.312	22470.493	33818.839	155128.80	0.22	ok
1400	-832.603	208.61	246.022	8243.919	6217.012	10325.378	155790.96	0.07	ok
1401	-858.566	212.14	248.074	14423.315	8450.863	16716.731	156453.12	0.11	ok
1402	-1396.617	260.573	98.601	7601.807	50506.687	51075.561	163947.01	0.31	ok
1403	-1432.545	266.28	101.549	-236.951	29797.957	29798.899	164137.81	0.18	ok
1404	-1468.478	271.312	103.804	-6393.798	8649.052	10755.778	164328.60	0.07	ok
1405	-1504.417	275.568	105.372	12445.126	10706.269	16416.618	164519.40	0.10	ok
1406	-975.329	260.594	104.769	8492.783	50389.935	51100.616	163616.01	0.31	ok
1407	-1011.097	266.113	107.748	170.047	29677.761	29678.248	163806.80	0.18	ok
1408	-1046.876	270.924	110.02	-5944.595	8547.96	10411.812	163997.60	0.06	ok
1409	-1082.667	274.959	111.594	13467.715	12268.947	18218.299	164188.39	0.11	ok
1410	-927.484	244.825	228.88	43036	47948.314	64429.326	157499.29	0.41	ok
1411	-953.447	250.287	231.864	25801.856	28484.727	38433.26	158161.45	0.24	ok
1412	-979.41	255.107	234.169	13070.694	8586.874	15638.972	158823.61	0.10	ok
1413	-1005.373	259.193	235.793	14637.401	9497.934	17448.904	159485.77	0.11	ok
1414	-713.972	242.512	228.497	44567.488	47194.314	64911.973	156784.66	0.41	ok
1415	-749.703	247.791	231.506	26509.011	27914.578	38496.121	157446.82	0.24	ok
1416	-785.448	252.401	233.818	14289.894	8215.185	16483.032	158108.98	0.10	ok
1417	-821.206	256.275	235.435	15448.441	10753.938	18822.899	158771.14	0.12	ok
1418	-545.836	129.757	116.953	15065.368	22326.413	26933.883	153145.54	0.18	ok
1419	-571.799	134.065	119.934	5767.603	12010.703	13323.747	153807.70	0.09	ok
1420	-597.762	137.827	122.223	884.591	1352.564	1616.1468	154469.86	0.01	ok
1421	-623.726	140.99	123.823	13577.769	7713.647	15615.895	155132.03	0.10	ok
1422	-638.581	139.013	208.635	38661.442	23967.675	45487.982	156278.26	0.29	ok
1423	-664.544	143.356	211.587	22086.221	12916.106	25585.679	156940.42	0.16	ok
1434	-690.508	147.137	213.834	7799.633	1540.335	7950.2772	157602.58	0.05	ok
1435	-716.471	150.302	215.389	16002.912	9210.742	18464.316	158264.74	0.12	ok
1436	-716.119	139.095	121.797	16742.372	26987.514	31758.982	153268.35	0.21	ok

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1437	-742.083	142.808	125.572	7059.511	15929.43	17423.646	153930.51	0.11	ok
1438	-768.046	146.084	128.51	-808.247	4576.169	4646.9975	154592.67	0.03	ok
1439	-794.009	148.861	130.594	11937.343	7264.417	13973.973	155254.83	0.09	ok
1440	-784.314	150.172	211.311	39959.359	29356.716	49583.94	155830.06	0.32	ok
1441	-810.277	154.065	215.088	23160.148	17418.024	28978.958	156492.22	0.19	ok
1442	-836.24	157.5	218.028	6343.538	5169.836	8183.3782	157154.38	0.05	ok
1443	-862.203	160.412	220.114	13815.542	7691.833	15812.447	157816.54	0.10	ok
1444	-683.403	128.256	117.865	15709.429	23757.072	28481.303	155703.45	0.18	ok
1445	-709.366	131.846	121.648	6339.163	13560.752	14969.268	156365.61	0.10	ok
1456	-735.329	134.981	124.59	-917.788	3079.016	3212.8919	157027.77	0.02	ok
1457	-761.292	137.616	126.675	11946.831	7612.189	14165.881	157689.93	0.09	ok
1458	-753.702	137.961	212.582	40284.705	25723.671	47797.12	157726.56	0.30	ok
1459	-779.666	141.73	216.366	23385.644	14755.79	27651.794	158388.72	0.17	ok
1460	-805.629	145.024	219.307	6884.241	3488.95	7717.8719	159050.88	0.05	ok
1461	-831.592	147.793	221.391	13943.775	7979.086	16065.325	159713.04	0.10	ok
1462	-937.476	166.585	251.488	47408.209	30152.571	56184.658	161123.26	0.35	ok
1463	-963.439	170.85	255.348	27417.858	16909.034	32212.643	161785.42	0.20	ok
1515	-989.403	174.578	258.364	9235.395	3326.463	9816.2048	162109.75	0.06	ok
1538	-1015.366	177.712	260.514	14532.946	8306.354	16739.236	162300.54	0.10	ok
1561	-768.598	139.771	217.773	41682.697	26296.455	49284.387	158948.45	0.31	ok
1584	-794.561	143.355	221.574	24369.759	15185.201	28713.681	159610.62	0.18	ok
1608	-820.525	146.501	224.535	7055.386	3788.487	8008.1899	160272.78	0.05	ok
1631	-846.488	149.148	226.638	13998.686	7579.398	15918.872	160934.94	0.10	ok
1654	-1191.814	187.422	114.152	12591.917	35726.583	37880.669	162435.86	0.23	ok
2171	-1217.777	191.836	117.856	3516.817	20826.501	21121.343	162626.65	0.13	ok
2221	-1243.741	195.736	120.735	-5847.964	5577.037	8080.9668	162817.45	0.05	ok
4988	-1269.704	199.046	122.774	11823.584	7567.268	14037.83	163008.24	0.09	ok
4989	-856.216	184.006	242.976	46062.014	35332.634	58052.598	156309.86	0.37	ok
4990	-882.179	188.419	246.722	26745.438	20704.184	33822.798	156972.02	0.22	ok
4991	-908.142	192.316	249.648	9591.075	5724.914	11169.752	157634.18	0.07	ok
4992	-934.105	195.623	251.73	14248.653	8045.408	16363.151	158296.34	0.10	ok
4993	-822.895	189.76	240.294	46080.725	37046.701	59126.063	155564.81	0.38	ok
4994	-848.858	194.208	243.977	26980.043	21960.774	34787.905	156226.97	0.22	ok
4995	-874.821	198.146	246.855	10179.207	6521.255	12088.963	156889.13	0.08	ok
4996	-900.784	201.495	248.905	14013.247	8061.164	16166.43	157551.29	0.10	ok
4997	-835.307	184.661	232.517	44650.642	35543.833	57070.517	155732.44	0.37	ok
4998	-861.27	189.057	236.127	26165.521	20863.312	33465.09	156394.60	0.21	ok
4999	-887.234	192.936	238.939	10761.036	5833.315	12240.403	157056.76	0.08	ok
5000	-913.197	196.226	240.937	13965.881	8179.572	16184.907	157718.92	0.10	ok
5001	-733.653	172.064	229.751	44413.969	31796.848	54622.708	156607.52	0.35	ok
5002	-759.617	176.318	233.358	26148.734	18117.722	31812.075	157269.68	0.20	ok
5003	-785.58	180.036	236.166	11609.004	4100.417	12311.88	157931.84	0.08	ok
5004	-811.543	183.162	238.16	13929.213	8617.377	16379.321	158594.00	0.10	ok
5005	-1054.458	231.717	319.429	56245.837	40530.593	69327.651	162874.73	0.43	ok
5006	-1080.421	235.138	322.777	30852.676	22109.106	37956.557	163065.52	0.23	ok
5007	-1106.384	237.938	325.183	13908.173	3419.686	14322.414	163256.31	0.09	ok
5008	-1132.348	240.09	326.681	19523.268	15237.349	24765.597	163447.11	0.15	ok
5009	-757.931	160.543	233.314	45676.887	32464.412	56038.523	153971.80	0.36	ok
5010	-783.894	164.253	236.942	27128.4	19702.017	33527.892	154633.96	0.22	ok
5011	-809.857	167.539	239.765	12201.229	6643.935	13892.871	155296.12	0.09	ok
5012	-835.82	170.328	241.766	13956.532	7739.394	15958.791	155958.28	0.10	ok
5013	-829.202	155.053	223.586	43201.056	30864.868	53093.986	156260.15	0.34	ok
5014	-855.165	158.805	227.259	25425.984	18538.95	31467.02	156922.31	0.20	ok
5015	-881.129	162.138	230.117	9593.666	5913.972	11270.026	157584.47	0.07	ok
5016	-907.092	164.975	232.144	13845.947	7127.465	15572.765	158246.63	0.10	ok
5017	-842.415	150.443	222.156	42849.885	29486.702	52015.173	156973.51	0.33	ok
5018	-868.378	154.158	225.919	25188.502	17527.198	30686.533	157635.67	0.19	ok
5019	-894.342	157.447	228.858	7490.563	5271.646	9159.628	158297.83	0.06	ok
5020	-920.305	160.239	230.949	13794.838	7185.288	15553.968	158959.99	0.10	ok
5021	-1103.619	193.692	104.641	10849.108	37591.625	39125.866	161560.17	0.24	ok
5022	-1129.582	198.137	108.282	2530.612	22193.085	22336.898	162044.84	0.14	ok
5023	-1155.546	202.072	111.114	-6071.443	6441.451	8851.8196	162235.64	0.05	ok

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5024	-1181.509	205.418	113.123	11413.541	7615.155	13720.769	162426.43	0.08	ok
5025	-1058.882	188.611	95.12	8969.295	36095.717	37193.4	160435.74	0.23	ok
5026	-1084.846	193.004	98.692	1407.22	21101.182	21148.053	161097.91	0.13	ok
5027	-1110.809	196.882	101.464	-6435.187	5758.072	8635.22	161760.07	0.05	ok
5028	-1136.772	200.172	103.425	11280.189	7724.255	13671.385	162102.44	0.08	ok
5029	-904.356	175.916	87.705	7524.193	32322.221	33186.435	159912.26	0.21	ok
5030	-930.319	180.172	91.275	558.72	18336.861	18345.371	160574.42	0.11	ok
5031	-956.282	183.892	94.045	-6641.994	4013.874	7760.623	161236.58	0.05	ok
5032	-982.246	187.022	96.003	11108.102	8142.257	13772.664	161898.74	0.09	ok
5033	-1136.366	137.106	99.878	10906.818	24263.541	26602.22	162723.21	0.16	ok
5034	-1162.329	140.857	103.515	2967.448	13363.618	13689.121	162914.01	0.08	ok
5035	-1188.293	144.134	106.353	-5237.736	2168.547	5668.9042	163104.80	0.03	ok
5036	-1214.256	146.889	108.373	10935.597	7181.332	13082.768	163295.60	0.08	ok
5037	-972.269	156.194	97.761	10512.405	29915.422	31708.723	158549.96	0.20	ok
5038	-998.232	160.07	101.433	2740.424	17497.979	17711.273	159212.13	0.11	ok
5039	-1024.195	163.491	104.302	-5309.096	4772.377	7138.7732	159874.29	0.04	ok
5040	-1050.159	166.39	106.345	10945.844	7189.642	13095.895	160536.45	0.08	ok
5041	-845.492	161.924	101.286	11471.668	31622.685	33639.164	156186.52	0.22	ok
5042	-871.456	165.845	104.966	3420.96	18749.723	19059.252	156848.68	0.12	ok
5043	-897.419	169.316	107.832	-4835.816	5565.052	7372.5789	157510.84	0.05	ok
5044	-923.382	172.268	109.865	11249.089	7127.941	13317.265	158173.00	0.08	ok
5045	-795.053	161.32	110.984	14014.48	31434.196	34416.774	155411.19	0.22	ok
5046	-821.016	165.209	114.749	5191.22	18609.242	19319.748	156073.35	0.12	ok
5047	-846.98	168.643	117.689	-2363.424	5475.16	5963.4847	156735.51	0.04	ok
5048	-872.943	171.557	119.783	11454.357	7342.052	13605.441	157397.67	0.09	ok
5049	-709.935	150.019	112.612	14404.539	28064.163	31545.015	156872.66	0.20	ok
5050	-735.898	153.775	116.414	5451.861	16137.651	17033.689	157534.82	0.11	ok
5051	-761.862	157.058	119.376	-1369.647	3912.547	4145.3537	158196.98	0.03	ok
5052	-787.825	159.819	121.48	11771.345	7767.229	14102.993	158859.14	0.09	ok

Column Section Designer Check

Conejo Crossover: B11 live load senario

Summary

Row Labels	Max of PMMRatio
B11 Strength 5	0.44
B11 Strength 1-2 Max	0.21
B11 Strength 1-1 Max	0.45

TABLE: Concrete Design 1 - Column Summary Data - ACI 318-05/IBC2003

Text	Text	Text	Text	in	Text	Unitless	Text	Text
Frame	**DesignSect**	**DesignType**	**DesignOpt**	**Location**	**PMMCombo**	**PMMRatio**	**VMajCombo**	**VMinCombo**
1260	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.40	B11 Strength 5	B11 Strength 5
1260	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 5	B11 Strength 5
1261	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.27	B11 Strength 5	B11 Strength 5
1261	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.14	B11 Strength 5	B11 Strength 5
1262	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.14	B11 Strength 5	B11 Strength 5
1262	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 5	B11 Strength 5
1263	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 5	B11 Strength 5
1263	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 5	B11 Strength 5
1264	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.40	B11 Strength 5	B11 Strength 5
1264	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 5	B11 Strength 5
1265	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 5	B11 Strength 5
1265	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.13	B11 Strength 5	B11 Strength 5
1266	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.13	B11 Strength 5	B11 Strength 5
1266	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 5	B11 Strength 5
1267	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 5	B11 Strength 5
1267	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 5	B11 Strength 5
1268	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.39	B11 Strength 5	B11 Strength 5
1268	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 5	B11 Strength 5
1269	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 5	B11 Strength 5
1269	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 5	B11 Strength 5
1270	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 5	B11 Strength 5
1270	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 5	B11 Strength 5
1271	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 5	B11 Strength 5
1271	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.32	B11 Strength 5	B11 Strength 5
1272	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.36	B11 Strength 1-2 Min	B11 Strength 5
1272	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
1273	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
1273	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1274	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1274	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1275	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1275	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 5
1276	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.37	B11 Strength 1-2 Min	B11 Strength 5
1276	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1277	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1277	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1278	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1278	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1279	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1279	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 5
1280	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.38	B11 Strength 1-2 Min	B11 Strength 5
1280	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1281	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1281	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1282	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1282	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1283	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1283	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 5
1284	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.36	B11 Strength 1-2 Min	B11 Strength 5
1284	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
1285	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
1285	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1286	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1286	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1287	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1287	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 5
1288	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.33	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1288	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1289	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1289	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min

1290	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1290	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1291	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1291	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1292	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.33	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1292	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1293	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1293	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1294	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1294	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1295	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1295	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1296	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1296	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1297	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1297	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1298	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1298	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1299	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1299	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1300	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1300	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1301	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1301	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1302	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1302	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1303	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1303	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.28	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1304	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1304	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1305	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1305	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1306	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1306	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1307	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1307	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1308	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1308	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1309	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1309	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1310	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1310	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1311	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1311	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1312	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.35	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1312	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1313	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1313	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1314	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1314	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1315	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1315	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1316	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.35	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1316	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1317	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1317	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1318	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1318	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1319	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1319	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.28	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1320	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.32	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1320	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1321	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1321	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1322	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1322	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1323	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1323	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1324	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.32	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1324	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1325	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1325	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1326	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1326	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min

1327	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1327	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1328	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1328	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1329	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1329	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1330	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1330	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1331	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1331	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1332	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1332	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1333	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1333	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1334	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1334	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1335	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1335	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1336	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1336	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1337	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1337	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1338	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1338	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1339	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1339	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1340	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1340	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.20	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1341	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.20	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1341	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.11	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1342	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.11	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1342	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1343	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1343	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1344	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1344	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1345	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1345	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.11	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1346	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.11	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1346	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1347	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1347	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1348	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.43	B11 Strength 5	B11 Strength 5
1348	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.29	B11 Strength 5	B11 Strength 5
1349	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.29	B11 Strength 5	B11 Strength 5
1349	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.19	B11 Strength 5	B11 Strength 5
1350	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.19	B11 Strength 5	B11 Strength 5
1350	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1351	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1351	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.34	B11 Strength 5	B11 Strength 5
1352	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.42	B11 Strength 5	B11 Strength 5
1352	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.29	B11 Strength 5	B11 Strength 5
1353	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.29	B11 Strength 5	B11 Strength 5
1353	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.18	B11 Strength 5	B11 Strength 5
1355	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.18	B11 Strength 5	B11 Strength 5
1355	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1356	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1356	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.34	B11 Strength 5	B11 Strength 5
1357	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.42	B11 Strength 5	B11 Strength 5
1357	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.28	B11 Strength 5	B11 Strength 5
1358	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.28	B11 Strength 5	B11 Strength 5
1358	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.17	B11 Strength 5	B11 Strength 5
1359	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.17	B11 Strength 5	B11 Strength 5
1359	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1360	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1360	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.33	B11 Strength 5	B11 Strength 5
1361	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.42	B11 Strength 5	B11 Strength 5
1361	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.29	B11 Strength 5	B11 Strength 5
1362	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.29	B11 Strength 5	B11 Strength 5
1362	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.17	B11 Strength 5	B11 Strength 5
1363	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.17	B11 Strength 5	B11 Strength 5
1363	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.20	B11 Strength 5	B11 Strength 5
1364	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.20	B11 Strength 5	B11 Strength 5
1364	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.34	B11 Strength 5	B11 Strength 5

1365	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.38	B11 Strength 1-2 Min	B11 Strength 5
1365	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
1366	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
1366	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-1 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
1367	Conejo Column 6ft	Column	Check	0	B11 Strength 1-1 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
1367	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.19	B11 Strength 1-2 Min	B11 Strength 5
1368	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.19	B11 Strength 1-2 Min	B11 Strength 5
1368	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.32	B11 Strength 1-2 Min	B11 Strength 5
1369	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.39	B11 Strength 1-2 Min	B11 Strength 5
1369	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
1370	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
1370	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
1371	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
1371	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.18	B11 Strength 1-2 Min	B11 Strength 5
1372	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.18	B11 Strength 5	B11 Strength 5
1372	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 5	B11 Strength 5
1373	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.39	B11 Strength 1-2 Min	B11 Strength 5
1373	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 5
1374	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 5
1374	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
1375	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
1375	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.18	B11 Strength 1-2 Min	B11 Strength 5
1376	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.18	B11 Strength 5	B11 Strength 5
1376	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 5	B11 Strength 5
1377	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.38	B11 Strength 1-2 Min	B11 Strength 5
1377	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
1378	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
1378	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
1379	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
1379	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.18	B11 Strength 1-2 Min	B11 Strength 5
1380	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.18	B11 Strength 1-2 Min	B11 Strength 5
1380	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 5
1381	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.37	B11 Strength 1-2 Min	B11 Strength 5
1381	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1382	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1382	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-1 Max	0.15	B11 Strength 1-2 Min	B11 Strength 5
1383	Conejo Column 6ft	Column	Check	0	B11 Strength 1-1 Max	0.15	B11 Strength 1-2 Min	B11 Strength 5
1383	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.18	B11 Strength 1-2 Min	B11 Strength 5
1384	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.18	B11 Strength 1-2 Min	B11 Strength 5
1384	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 5
1385	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.39	B11 Strength 1-2 Min	B11 Strength 5
1385	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
1386	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
1386	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-1 Max	0.18	B11 Strength 1-2 Min	B11 Strength 5
1387	Conejo Column 6ft	Column	Check	0	B11 Strength 1-1 Max	0.18	B11 Strength 1-2 Min	B11 Strength 5
1387	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.20	B11 Strength 1-2 Min	B11 Strength 5
1388	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.20	B11 Strength 1-2 Min	B11 Strength 5
1388	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 5
1389	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1389	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1390	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1390	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1391	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1391	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1392	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1392	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1393	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.40	B11 Strength 5	B11 Strength 5
1393	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 5	B11 Strength 5
1395	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 5	B11 Strength 5
1395	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.12	B11 Strength 5	B11 Strength 5
1396	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.12	B11 Strength 5	B11 Strength 5
1396	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 5	B11 Strength 5
1397	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 5	B11 Strength 5
1397	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 5	B11 Strength 5
1398	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.37	B11 Strength 1-2 Min	B11 Strength 5
1398	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1399	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1399	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1400	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
1400	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1401	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1401	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 5
1402	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.43	B11 Strength 5	B11 Strength 5
1402	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-1 Max	0.30	B11 Strength 5	B11 Strength 5

1403	Conejo Column 6ft	Column	Check	0	B11 Strength 1-1 Max	0.30	B11 Strength 5	B11 Strength 5
1403	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.21	B11 Strength 5	B11 Strength 5
1404	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.21	B11 Strength 5	B11 Strength 5
1404	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1405	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1405	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.34	B11 Strength 5	B11 Strength 5
1406	Conejo Column 6ft	Column	Check	0	B11 Strength 1-1 Max	0.45	B11 Strength 5	B11 Strength 5
1406	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-1 Max	0.33	B11 Strength 5	B11 Strength 5
1407	Conejo Column 6ft	Column	Check	0	B11 Strength 1-1 Max	0.33	B11 Strength 5	B11 Strength 5
1407	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-1 Max	0.20	B11 Strength 5	B11 Strength 5
1408	Conejo Column 6ft	Column	Check	0	B11 Strength 1-1 Max	0.20	B11 Strength 5	B11 Strength 5
1408	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1409	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.19	B11 Strength 5	B11 Strength 5
1409	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.33	B11 Strength 5	B11 Strength 5
1410	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.40	B11 Strength 5	B11 Strength 5
1410	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 5	B11 Strength 5
1411	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 5	B11 Strength 5
1411	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.14	B11 Strength 5	B11 Strength 5
1412	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.14	B11 Strength 5	B11 Strength 5
1412	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 5	B11 Strength 5
1413	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 5	B11 Strength 5
1413	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 5	B11 Strength 5
1414	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.41	B11 Strength 5	B11 Strength 5
1414	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 5	B11 Strength 5
1415	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 5	B11 Strength 5
1415	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.13	B11 Strength 5	B11 Strength 5
1416	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.13	B11 Strength 5	B11 Strength 5
1416	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 5	B11 Strength 5
1417	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 5	B11 Strength 5
1417	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 5	B11 Strength 5
1418	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.32	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1418	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1419	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1419	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.10	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1420	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.10	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1420	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1421	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
1421	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1422	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1422	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1423	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1423	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1434	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1434	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1435	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1435	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.28	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1436	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1436	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1437	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1437	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.11	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1438	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.11	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1438	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1439	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1439	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1440	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.33	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1440	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.22	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1441	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.22	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1441	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1442	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1442	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1443	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1443	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1444	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1444	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1445	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.21	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1445	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1456	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1456	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1457	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
1457	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1458	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.32	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1458	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.22	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1459	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.22	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1459	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min

1460	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1460	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1461	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1461	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1462	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.37	B11 Strength 1-2 Min	B11 Strength 5
1462	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1463	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
1463	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 5
1515	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.14	B11 Strength 1-2 Min	B11 Strength 5
1515	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 5
1538	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 5
1538	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.31	B11 Strength 1-2 Min	B11 Strength 5
1561	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.33	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1561	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.22	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1584	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.22	B11 Strength 1-2 Min	B11 Strength 5
1584	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 1-2 Min
1608	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 5
1608	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1631	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
1631	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 5
1654	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.38	B11 Strength 1-2 Min	B11 Strength 5
1654	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
2171	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
2171	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
2221	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
2221	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 5
4988	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 5
4988	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 5
4989	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.37	B11 Strength 1-2 Min	B11 Strength 5
4989	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
4990	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
4990	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
4991	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
4991	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
4992	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
4992	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.29	B11 Strength 1-2 Min	B11 Strength 5
4993	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.38	B11 Strength 1-2 Min	B11 Strength 5
4993	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
4994	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
4994	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
4995	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
4995	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
4996	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
4996	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.29	B11 Strength 1-2 Min	B11 Strength 5
4997	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.36	B11 Strength 1-2 Min	B11 Strength 5
4997	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
4998	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
4998	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
4999	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
4999	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5000	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5000	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.28	B11 Strength 1-2 Min	B11 Strength 5
5001	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.35	B11 Strength 1-2 Min	B11 Strength 5
5001	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5002	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5002	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
5003	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
5003	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
5004	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
5004	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.28	B11 Strength 1-2 Min	B11 Strength 5
5005	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.44	B11 Strength 5	B11 Strength 5
5005	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.29	B11 Strength 5	B11 Strength 5
5006	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.29	B11 Strength 5	B11 Strength 5
5006	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-1 Max	0.16	B11 Strength 5	B11 Strength 5
5007	Conejo Column 6ft	Column	Check	0	B11 Strength 1-1 Max	0.16	B11 Strength 5	B11 Strength 5
5007	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.22	B11 Strength 5	B11 Strength 5
5008	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.22	B11 Strength 5	B11 Strength 5
5008	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.40	B11 Strength 5	B11 Strength 5
5009	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.36	B11 Strength 1-2 Min	B11 Strength 5
5009	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5010	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5010	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
5011	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
5011	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5

5012	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5012	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
5013	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 5
5013	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5014	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5014	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
5015	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
5015	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5016	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5016	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
5017	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 5
5017	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 1-2 Min
5018	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 5
5018	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 5
5019	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 5
5019	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
5020	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
5020	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 5
5021	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.38	B11 Strength 1-2 Min	B11 Strength 5
5021	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
5022	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.26	B11 Strength 1-2 Min	B11 Strength 5
5022	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
5023	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
5023	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 5
5024	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 5
5024	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.30	B11 Strength 1-2 Min	B11 Strength 5
5025	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.37	B11 Strength 1-2 Min	B11 Strength 5
5025	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
5026	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.25	B11 Strength 1-2 Min	B11 Strength 5
5026	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.15	B11 Strength 1-2 Min	B11 Strength 5
5027	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.15	B11 Strength 1-2 Min	B11 Strength 5
5027	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
5028	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
5028	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.29	B11 Strength 1-2 Min	B11 Strength 5
5029	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.36	B11 Strength 1-2 Min	B11 Strength 5
5029	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5030	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5030	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.14	B11 Strength 1-2 Min	B11 Strength 5
5031	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.14	B11 Strength 1-2 Min	B11 Strength 5
5031	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
5032	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.16	B11 Strength 1-2 Min	B11 Strength 5
5032	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.29	B11 Strength 1-2 Min	B11 Strength 5
5033	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.36	B11 Strength 1-2 Min	B11 Strength 5
5033	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5034	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5034	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
5035	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.16	B11 Strength 1-2 Min	B11 Strength 5
5035	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 5
5036	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.17	B11 Strength 1-2 Min	B11 Strength 5
5036	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.28	B11 Strength 1-2 Min	B11 Strength 5
5037	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.35	B11 Strength 1-2 Min	B11 Strength 5
5037	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5038	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.24	B11 Strength 1-2 Min	B11 Strength 5
5038	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.15	B11 Strength 1-2 Min	B11 Strength 5
5039	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.15	B11 Strength 1-2 Min	B11 Strength 5
5039	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5040	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5040	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 5
5041	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 5
5041	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 5
5042	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 5
5042	Conejo Column 6ft	Column	Check	79.5	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
5043	Conejo Column 6ft	Column	Check	0	B11 Strength 1-2 Max	0.13	B11 Strength 1-2 Min	B11 Strength 5
5043	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5044	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5044	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 5
5045	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.34	B11 Strength 1-2 Min	B11 Strength 5
5045	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 5
5046	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.23	B11 Strength 1-2 Min	B11 Strength 5
5046	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
5047	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.12	B11 Strength 1-2 Min	B11 Strength 5
5047	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5048	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5048	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 5

5049	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.33	B11 Strength 1-2 Min	B11 Strength 5
5049	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.22	B11 Strength 1-2 Min	B11 Strength 5
5050	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.22	B11 Strength 1-2 Min	B11 Strength 5
5050	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 5
5051	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.13	B11 Strength 1-2 Min	B11 Strength 5
5051	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5052	Conejo Column 6ft	Column	Check	0	B11 Strength 5	0.15	B11 Strength 1-2 Min	B11 Strength 5
5052	Conejo Column 6ft	Column	Check	79.5	B11 Strength 5	0.27	B11 Strength 1-2 Min	B11 Strength 5

Column Capacity Plot - Viaduct

Conejo Crossover: B11 live load senario

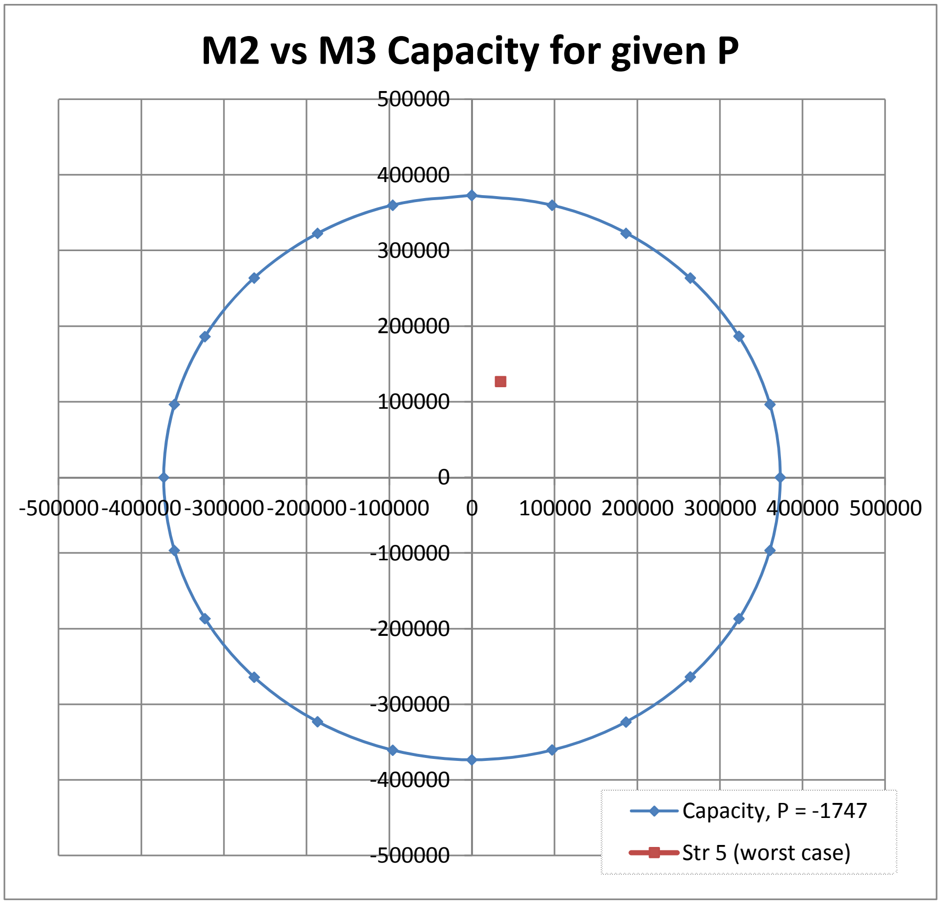
Strength 1

P	-1747	kips
M2	34353	kip-in
M3	126805	kip-in

Loads from most onerous load case and column section as identified by SAP section designer - see Column Strength Calculations (1)

10ft dia Column Capacity for P = -1747

	kip-in	kip-in
Angle	M2	M3
0	-435	373101
15	96929	360172
30	186245	323098
45	263902	263659
60	322867	186553
75	360259	96431
90	372944	0
105	360259	-96431
120	322867	-186553
135	263902	-263659
150	186245	-323098
165	96929	-360172
180	-435	-373101
195	-96089	-360357
210	-186907	-322767
225	-263613	-263899
240	-323007	-186422
255	-360187	-96397
270	-373050	0
285	-360187	96397
300	-323007	186422
315	-263613	263899
330	-186907	322767
345	-96089	360357
0	-435	373101



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

Column Capacity Plot - Crossover

Conejo Crossover: B11 live load senario

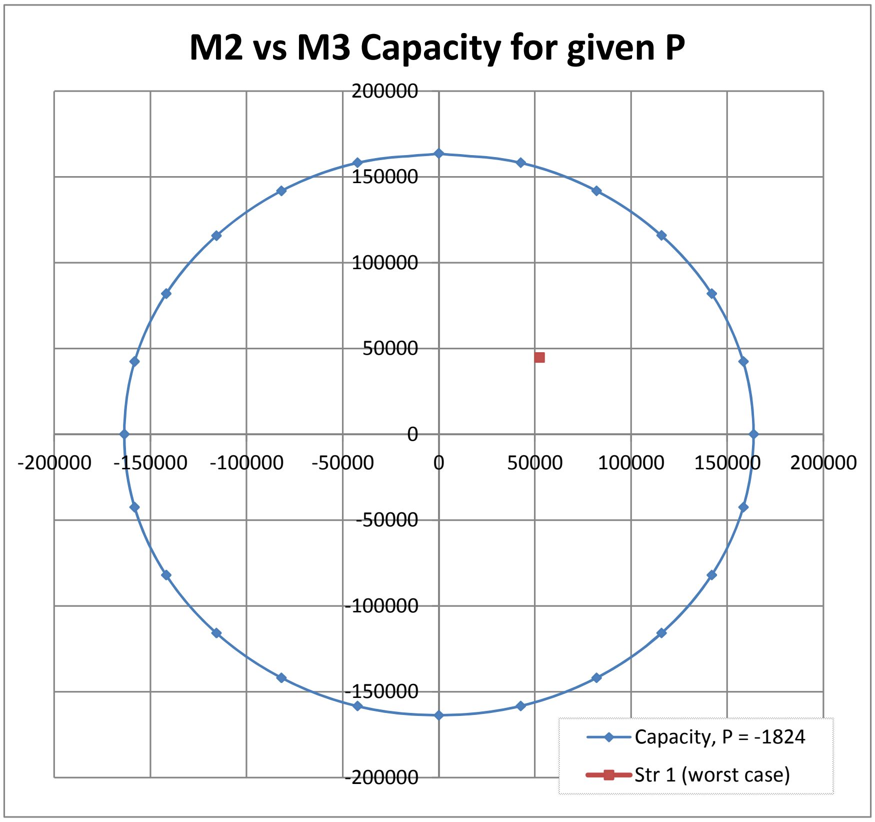
Strength 1

P	-1824	kips
M2	52301	kip-in
M3	44591	kip-in

Loads from most onerous load case and column section as identified by SAP section designer - see Column Strength Calculations (1)

6ft dia Column Capacity for P = -1824

Angle	M2 (kip-in)	M3 (kip-in)
0	-38	163619
15	42433	158259
30	81931	141913
45	115664	115826
60	141905	81951
75	158282	42451
90	163649	0
105	158282	-42451
120	141905	-81951
135	115664	-115826
150	81931	-141913
165	42433	-158259
180	-38	-163619
195	-42375	-158286
210	-81976	-141864
225	-115701	-115720
240	-141879	-82046
255	-158289	-42402
270	-163624	0
285	-158289	42402
300	-141879	82046
315	-115701	115720
330	-81976	141864
345	-42375	158286
0	-38	163619



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

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Pile Capacity Output - Crossover

Conejo Crossover: B11 live load senario

9ft diameter mono-pile shaft (1% reinforcement) using expected material properties

Pile 1 (M2)

P	-914	kips
M2	194340	kip-in
M3	0	kip-in

Pile 1 (M3)

P	-914
M2	0
M3	194340

Pile 1 (M2 & M3)

P	-914
M2	137419
M3	137419

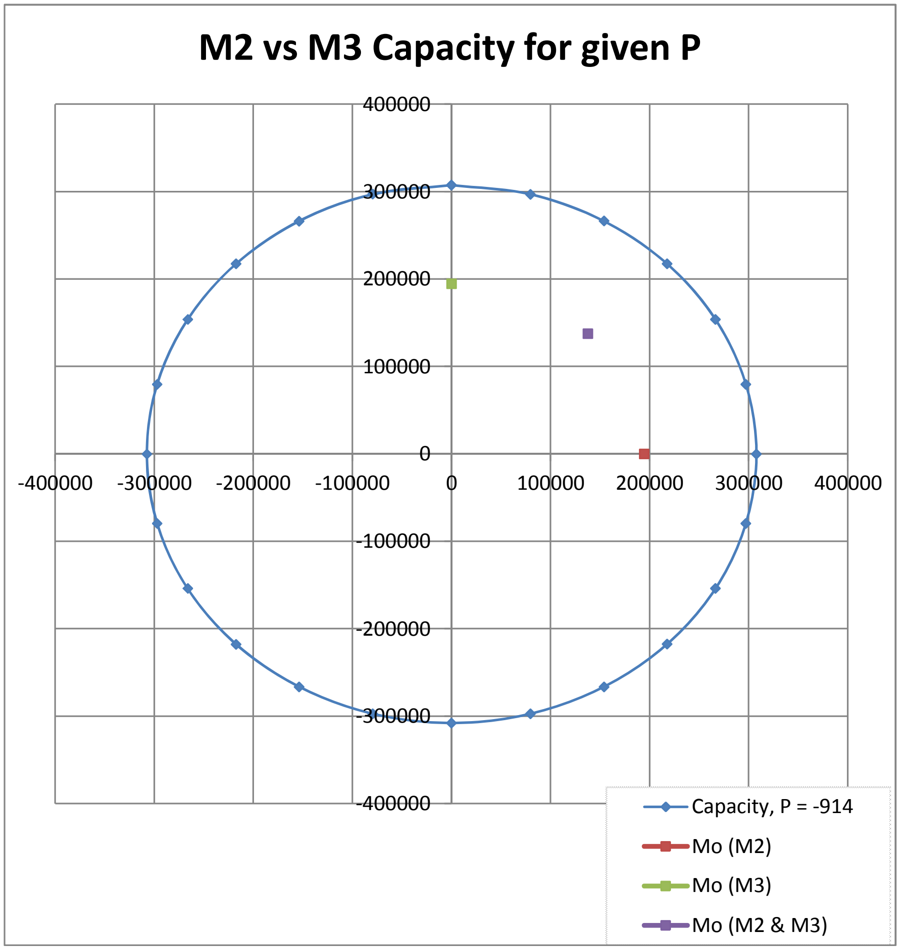
Moments are derived from column overstrength moment M_o and associated overstrength shear V_o (CSDC 4.3.1)

Axial load, P is taken as the push/pull force on the tension pile subtracted by the column load used for M_o

Note: P is tension-positive

9ft dia Pile Capacity for P = -913.833

	kip-in	kip-in
Angle	M2	M3
0	-159	307650
15	79724	297051
30	153812	266403
45	217583	217474
60	266379	153854
75	297097	79567
90	307671	0
105	297097	-79567
120	266379	-153854
135	217583	-217474
150	153812	-266403
165	79724	-297051
180	-159	-307650
195	-79425	-297177
210	-153888	-266290
225	-217534	-217607
240	-266370	-153755
255	-297139	-79620
270	-307621	0
285	-297139	79620
300	-266370	153755
315	-217534	217607
330	-153888	266290
345	-79425	297177
0	-159	307650



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

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Pile Capacity Output - Viaduct

Conejo Crossover: B11 live load senario

Worst case in column location next to crossover structure with only 2no. piles. Consider this case only

Pile 1 (M2)

P	268	kips
M2	0	kip-in
M3	112522	kip-in

Pile 1 (M3)

P	-989
M2	311211
M3	12414

Pile 1 (M2 & M3)

P	-100
M2	220049
M3	83197

Pile 2 (M2)

P	-2245	kips
M2	0	kip-in
M3	87695	kip-in

Pile 2 (M3)

P	-989
M2	311211
M3	-12414

Pile 2 (M2 & M3)

P	-1877
M2	220049
M3	58370

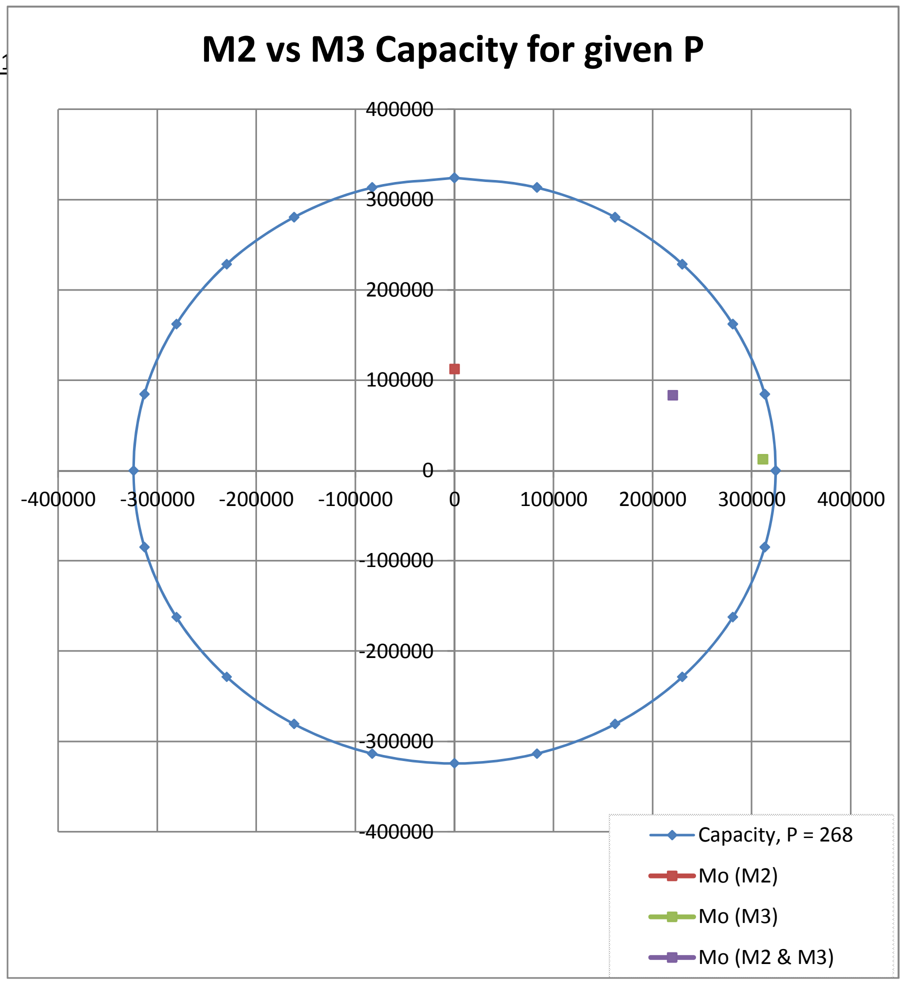
Moments are derived from column overstrength moment M_o and associated overstrength shear V_o (CSDC 4.3.1)

Axial load, P is taken as the push/pull force on the tension pile subtracted by the column load used for M_o

Note: P is tension-positive

6.5ft dia Pile Capacity for P = 267.661

	kip-in	kip-in
Angle	M2	M3
0	0	324260
15	83058	313547
30	162058	280663
45	229964	228691
60	280853	162166
75	313076	84815
90	324056	0
105	313076	-84815
120	280853	-162166
135	229964	-228691
150	162058	-280663
165	83058	-313547
180	0	-324260
195	-83058	-313547
210	-162058	-280663
225	-229964	-228691
240	-280853	-162166
255	-313076	-84815
270	-324056	0
285	-313076	84815
300	-280853	162166
315	-229964	228691
330	-162058	280663
345	-83058	313547
0	0	324260



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

Dowel Strength Calculations

Conejo Crossover: B11 live load senario

Maximum

Row Labels	Max of P	Max of V2	Max of V3	Max of T	Max of M2	Max of M3
B11 Strength 1-1 Max	0	0	621.666	0	3933.184	0
B11 Strength 5	0	0	279.46	0	2473.057	0
B11 Strength 1-2 Max	0	0	1208.195	0	4711.55	0
B11 Strength 1-1 Min	0	0	667.175	0	4194.046	0
B11 Strength 1-2 Min	0	0	1168.024	0	4539.018	0

Minimum

Row Labels	Min of P	Min of V2	Min of V3	Min of T	Min of M2	Min of M3
B11 Strength 1-1 Max	0	0	-655.384	0	-3114.887	0
B11 Strength 5	0	0	-262.596	0	-2245.448	0
B11 Strength 1-2 Max	0	0	-1303.412	0	-5074.506	0
B11 Strength 1-1 Min	0	0	-695.555	0	-3285.464	0
B11 Strength 1-2 Min	0	0	-1257.903	0	-4813.644	0

Input

Dowel diameter	12	in	AASHTO LRFD 2007
E	29000	kip/in2	
I	1017.876	in4	
Zp	288	in4	
Fy	50	kip/in2	
Resistance Factor	0.8		6.5.4.2

Flexure

Mn (elastic)	8482	kip-in	AASHTO LRFD C6.12.2.2.3
Mr	6786	kip-in	taking elastic modulus, not plastic (conservative)
M	5075	kip-in	
D/C	0.75	ok	

Shear

Vn	3280	kips	AASHTO LRFD C6.13.5.3
Vr	2624	kips	
V	1303	kips	
D/C	0.50	ok	

Column Strength Calculations (1)

Conejo Crossover: B32 Live Load Senario

Strength 1

Loads from most onerous column, as identified by the SAP Section Design check

Description	Units	Reference	Crossover	Viaduct
CSiBridge Model			Conejo Force B31	Conejo Force B31
Axial	k	CSiBridge	1958.642	1987.262
Shear V2	k	CSiBridge	166.785	381.33
Moment M3	k-in	CSiBridge	29381.582	119298.818
Shear V3	k	CSiBridge	297.597	63.607
Moment M2	k-in	CSiBridge	63255.636	29358.401

Φ Flexure		(CSDC 3.2.1 per TM 2.10.4)	1.00	1.00
Φ Shear		(CSDC 3.2.1 per TM 2.10.4)	0.90	0.90

Column Shear Capacity

Description	Units	Reference	Crossover	Viaduct
$A_e = .8 \times A_g$	in^2	(CSDC 3.6.2 per TM 2.10.4)	3257	9048
$\rho_s \times f_{yh}$	ksi		1.50	0.85
$\rho_s \times f_{yh} \leq .35$	ksi		0.35	0.35
μ_d max			1.5	1.5
Factor 1 = $\rho_s \times f_{yh}$ / .15 ksi + 3.67 - μ_d			4.52	4.50
.3 ≤ Factor 1 ≤ 3			3.00	3.00
Factor 2 (Assume Pc=0 except B35)			1	2
v_c Inside Plastic Hinge Zone=Factor 1 x Factor 2 x fc' ^.5	psi		212	424
v_c Inside Plastic Hinge Zone ≤ 4 fc'^.5	psi		212	283
v_c Outisde Plastic Hinge Zone=3 x Factor 2 x fc' ^.5	psi		212	424
v_c Outisde Plastic Hinge Zone ≤ 4 fc'^.5	psi		212	283
$V_c = v_c \times A_e$		(CSDC 3.6.2 per TM 2.10.4)		
V_c Inside PH Zone =	k		691	2559
V_c Outwide PH Zone =	k		691	2559
$A_v = n \times (\pi/2) \times A_b$	in^2	(CSDC 3.6.3 per TM 2.10.4) 2 hoops	2.48	42.73

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Min $A_v = .025 \times D' \times s / f_{yh}$	in^2	(CSDC 3.6.5 per TM 2.10.4)	0.11	0.19
			Min OK	**Min OK**
$V_s = A_v \times f_{yh} \times D' / s \leq 8 \times fc'^{.5} \times A_e$	k		1843	5118
$\Phi V_n = V_c + V_s$	k	(CSDC 3.6.1 per TM 2.10.4)		
ΦVn^{col} Inside PH Zone	k		2280	6910
ΦVn^{col} Outside PH Zone	k		2280	6910

Column Force Demand

Description	Units	Reference	Crossover	Viaduct
Extreme DL	k		2000	2000
M_p^{col} (Caltrans Idealized)	k-in	CSiBridge Section Design	194340	476606
$M_o^{col} = 1.2 \times M_p^{col}$	k-in	(CSDC Eq. 4.4 per TM 2.10.4)	194340	476606
$V_o^{col} = M_o^{col} / L$	k		611	1499
Vmax (SRSS)			341	387
ΦVn Inside PH Zone	k		2280	6910
ΦVn Outside PH Zone	k		2280	6910
$\Phi V_n^{col} \geq V_o^{col}$		(CSDC 3.6 per TM 2.10.4)	**Vn OK**	**Vn OK**
Axial DL	k	CSiBridge	1959	1987
$Md = \sqrt{(M2^2+M3^2)}$	k-in		69746	122858
Mn	k-in	CSiBridge	164333	383160
$\Phi M_n^{col} \geq M_o^{col}$		CSiBridge	**Mn OK**	**Mn OK**

Column Strength Calculations (2)

Conejo Crossover: B32 Live Load Senario

Summary

	kips	kips	kips	kip-in	kip-in	kips
Row Labels	**Max of P**	**Max of V2**	**Max of V3**	**Max of M2**	**Max of M3**	**Min of P**
B32 Strength 1-1 Max	-1094.839	223.439	290.537	62246.16	38875.093	-2402.694
B32 Strength 5	-705.436	276.311	322.65	56065.661	46586.475	-1892.436
B32 Strength 1-2 Max	-875.49	162.453	182.878	50303.691	31807.778	-2282.662
B32 Strength 1-1 Min	-824.752	220.445	255.58	54024.92	38000.137	-1901.086
B32 Strength 1-2 Min	-605.404	158.563	147.921	42082.45	30704.966	-1781.054

Max D/C
0.468

Strength 1: All Column Sections

OutputCase	B32 Strength 5

Str5 Identified as worst case by SAP section check

	Column Labels								
	Max of P	**Max of V2**	**Max of V3**	**Max of M2**	**Max of M3**	**[M]**	**M**	**D/C**	
Row Labels	**0**	**0**	**0**	**0**	**0**	**kip-in**	**kip-in**		
1260	-1172.938	181.867	265.368	49125.53	35616.522	60678.286	155723.33	0.39	ok
1261	-1208.868	186.488	269.037	28028.799	21158.111	35118.076	156383.11	0.22	ok
1262	-1244.804	190.581	271.879	6686.477	6332.341	9209.0997	157042.99	0.06	ok
1263	-1280.745	194.064	273.885	13644.584	7798.212	15715.813	157702.97	0.10	ok
1264	-1134.177	180.567	259.66	48122.675	35220.668	59634.615	155004.17	0.38	ok
1265	-1170.096	185.19	263.326	27479.696	20865.629	34503.741	155663.75	0.22	ok
1266	-1206.02	189.286	266.164	6590.32	6143.436	9009.6683	156323.41	0.06	ok
1267	-1241.95	192.771	268.167	14026.531	7723.209	16012.231	156983.20	0.10	ok
1268	-1056.251	174.55	255.626	47893.617	33332.109	58350.904	153635.66	0.38	ok
1269	-1092.039	178.957	259.339	27576.571	19455.38	33748.764	154292.82	0.22	ok
1270	-1127.838	182.806	262.223	6998.31	5228.307	8735.6475	154950.19	0.06	ok
1271	-1163.649	186.04	264.264	14776.059	8988.562	17295.264	155607.78	0.11	ok
1272	-897.1	188.314	253.738	47408.086	35451.52	59197.44	150534.54	0.39	ok
1273	-932.847	192.983	257.457	27238.617	20480.594	34079.275	151190.93	0.23	ok
1274	-968.606	197.062	260.342	6800.544	5138.422	8523.5427	151847.58	0.06	ok
1275	-1004.379	200.49	262.381	14906.734	9094.622	17462.041	152504.46	0.11	ok
1276	-1041.106	199.318	254.104	47537.197	38748.718	61329.016	153292.35	0.40	ok
1277	-1076.994	204.151	257.858	27342.738	22902.928	35667.484	153951.35	0.23	ok
1278	-1112.889	208.417	260.775	6884.252	6672.907	9587.5238	154610.48	0.06	ok
1279	-1148.791	212.034	262.84	14850.328	8484.782	17103.326	155269.74	0.11	ok
1280	-1050.559	200.977	257.199	48389.198	39259.458	62312.274	153478.30	0.41	ok
1281	-1086.442	205.868	261.012	27941.875	23281.78	36370.175	154137.23	0.24	ok
1282	-1122.333	210.198	263.983	7220.304	6915.313	9997.7169	154796.27	0.06	ok
1283	-1158.231	213.881	266.093	14793.077	8163.831	16896.25	155455.46	0.11	ok
1284	-848.302	182.092	253.477	47552.095	33626.655	58240.481	149903.30	0.39	ok
1285	-884.054	186.765	257.346	27402.15	19150.303	33430.703	150559.80	0.22	ok
1286	-919.819	190.847	260.361	6960.041	4302.454	8182.4985	151216.53	0.05	ok
1287	-955.596	194.278	262.504	14872.955	8770.676	17266.428	151873.51	0.11	ok
1288	-1162.924	185.367	226.587	42465.492	36351.007	55899.139	155559.48	0.36	ok
1289	-1198.81	189.474	230.359	24475.88	21615.721	32654.373	156218.43	0.21	ok
1290	-1234.703	193.107	233.292	6323.166	6559.399	9110.8805	156877.52	0.06	ok
1291	-1270.603	196.192	235.371	15515.597	8201.352	17549.813	157536.75	0.11	ok
1292	-1153.317	185.33	225.113	41957.215	36263.474	55456.717	155396.33	0.36	ok
1293	-1189.193	189.4	228.877	24077.952	21534.664	32303.088	156055.11	0.21	ok
1294	-1225.076	192.988	231.8	6154.837	6483.456	8939.6432	156714.02	0.06	ok
1295	-1260.967	196.025	233.87	15474.705	8624.11	17715.58	157373.08	0.11	ok
1296	-1146.572	182.416	227.099	42374.494	35280.999	55139.338	155461.10	0.35	ok

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1297	-1182.363	186.365	230.874	24320.545	20778.925	31988.32	156118.32	0.20	ok
1298	-1218.165	189.811	233.812	6131.376	5989.904	8571.623	156775.74	0.05	ok
1299	-1253.975	192.702	235.894	15464.059	9587.597	18195.031	157433.31	0.12	ok
1300	-1120.671	189.54	220.772	41834.194	35539.051	54891.93	154556.90	0.36	ok
1301	-1156.449	194.007	224.332	24331.428	20470.594	31797.226	155213.90	0.20	ok
1302	-1192.24	197.909	227.109	7204.728	5102.305	8828.4552	155871.10	0.06	ok
1303	-1228.041	201.188	229.087	14832.157	11153.588	18557.893	156528.52	0.12	ok
1304	-1263.276	206.365	200.376	38174.635	40368.625	55560.135	157382.02	0.35	ok
1305	-1299.214	210.991	203.379	22285.811	23962.639	32724.08	158041.94	0.21	ok
1306	-1335.157	215.069	205.704	6897.601	7220.843	9985.8637	158701.95	0.06	ok
1307	-1371.105	218.522	207.345	13641.781	10856.364	17434.415	159362.06	0.11	ok
1308	-1317.094	213.059	191.446	36559.443	42192.05	55827.968	158381.01	0.35	ok
1309	-1353.042	217.761	194.036	21378.865	25258.403	33091.431	159041.11	0.21	ok
1310	-1388.994	221.918	196.038	6987.82	7970.756	10600.122	159701.29	0.07	ok
1311	-1424.951	225.448	197.443	13064.952	10773.431	16933.983	160361.56	0.11	ok
1312	-1345.487	212.467	194.973	36965.067	41839.338	55829.619	158864.83	0.35	ok
1313	-1381.43	217.174	197.339	21509.343	24948.176	32940.299	159524.84	0.21	ok
1314	-1417.378	221.334	199.148	7165.4	7701.638	10519.419	160184.95	0.07	ok
1315	-1453.331	224.864	200.403	13604.181	10826.351	17386.305	160845.14	0.11	ok
1316	-1298.957	200.909	204.261	38288.713	38214.587	54096.028	158031.53	0.34	ok
1317	-1334.91	205.554	206.641	22058.297	22245.967	31328.127	158691.73	0.20	ok
1318	-1370.867	209.64	208.458	7334.103	5931.307	9432.3629	159351.99	0.06	ok
1319	-1406.828	213.1	209.717	14965.624	10860.073	18490.838	160012.34	0.12	ok
1320	-1087.116	182.842	114.547	15135.576	34700.593	37857.85	154173.02	0.25	ok
1321	-1123.071	187.427	116.982	6029.067	20164.685	21046.714	154833.27	0.14	ok
1322	-1159.031	191.473	118.868	-3148.353	5265.521	6134.9685	155493.60	0.04	ok
1323	-1194.995	194.903	120.199	12428.747	8826.085	15243.803	156153.99	0.10	ok
1324	-1135.714	194.615	103.046	13342.553	38166.109	40431.122	155041.75	0.26	ok
1325	-1171.672	199.267	105.484	5151.381	22694.256	23271.57	155702.03	0.15	ok
1326	-1207.634	203.389	107.376	-3177.192	6852.94	7553.6306	156362.41	0.05	ok
1327	-1243.601	206.896	108.713	11212.626	8946.816	14344.633	157022.85	0.09	ok
1328	-1098.279	196.394	100.307	13004.146	38681.118	40808.537	154368.77	0.26	ok
1329	-1134.221	201.05	102.966	5029.738	23067.806	23609.785	155028.76	0.15	ok
1330	-1170.168	205.174	105.033	-3108.698	7084.362	7736.4196	155688.85	0.05	ok
1331	-1206.12	208.684	106.495	10877.133	9043.079	14145.293	156349.01	0.09	ok
1332	-965.039	175.711	131.6	18622.553	32522.228	37476.59	151725.78	0.25	ok
1333	-1000.854	180.157	135.17	8165.339	18553.186	20270.507	152383.44	0.13	ok
1334	-1036.679	184.041	137.951	-2520.228	4233.527	4926.8956	153041.29	0.03	ok
1335	-1072.514	187.307	139.927	12761.829	9665.382	16008.869	153699.32	0.10	ok
1336	-941.222	162.82	141.598	20236.33	31075.163	37083.349	151645.19	0.24	ok
1337	-976.993	166.505	145.391	8979.278	18131.712	20233.3	152302.04	0.13	ok
1338	-1012.776	169.726	148.343	-2544.826	4894.835	5516.8423	152959.12	0.04	ok
1339	-1048.571	172.436	150.437	13546.346	8836.739	16173.789	153616.41	0.11	ok
1340	-978.305	167.196	140.605	20088.269	32423.381	38142.027	152152.86	0.25	ok
1341	-1014.181	171.007	144.388	8910.179	19131.688	21104.805	152811.65	0.14	ok
1342	-1050.065	174.374	147.333	-2549.667	5536.631	6095.4971	153470.57	0.04	ok
1343	-1085.957	177.229	149.422	13578.142	7988.731	15753.913	154129.63	0.10	ok
1344	-970.048	169.133	138.736	19716.201	33014.121	38453.358	151985.98	0.25	ok
1345	-1005.918	172.984	142.527	8686.714	19568.641	21410.061	152644.65	0.14	ok
1346	-1041.796	176.397	145.481	-2634.98	5816.524	6385.5361	153303.47	0.04	ok
1347	-1077.681	179.3	147.579	13571.241	7729.044	15617.833	153962.42	0.10	ok
1348	-1420.089	204.224	114.994	9914.425	39280.391	40512.281	160267.19	0.25	ok
1349	-1456.011	209.098	118.639	772.425	23044.607	23057.549	160926.82	0.14	ok
1350	-1491.939	213.409	121.452	-8125.766	6433.749	10364.42	161586.54	0.06	ok
1351	-1527.872	217.07	123.426	10611.781	7497.397	12993.108	162246.38	0.08	ok
1352	-1387.302	202.038	111.515	9506.373	38719.022	39868.958	159646.81	0.25	ok
1353	-1423.23	206.914	115.142	661.301	22657.025	22666.674	160306.56	0.14	ok
1355	-1459.164	211.227	117.936	-7857.539	6221.102	10022.127	160966.39	0.06	ok
1356	-1495.103	214.891	119.895	11062.33	7421.983	13321.448	161626.33	0.08	ok

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1357	-1345.769	198.427	109.48	9443.083	37707.214	38871.658	158887.09	0.24	ok
1358	-1381.693	203.24	113.13	739.412	21932.251	21944.712	159546.77	0.14	ok
1359	-1417.624	207.483	115.948	-7692.658	5791.434	9629.0028	160206.54	0.06	ok
1360	-1453.56	211.075	117.929	11436.069	7764.324	13822.749	160866.42	0.09	ok
1361	-1271.136	194.669	103.011	8105.917	36599.479	37486.368	157636.47	0.24	ok
1362	-1306.912	199.324	106.653	-77.44	21123.294	21123.436	158293.42	0.13	ok
1363	-1342.699	203.386	109.458	-7638.982	5308.831	9302.5659	158950.57	0.06	ok
1364	-1378.498	206.797	111.426	11911.109	8824.661	14823.939	159607.93	0.09	ok
1365	-1154.382	198.289	106.932	9181.003	36712.572	37843.147	155215.81	0.24	ok
1366	-1190.178	203.24	110.591	679.878	20948.615	20959.645	155873.12	0.13	ok
1367	-1225.986	207.564	113.41	-7604.823	4815.653	9001.3247	156530.65	0.06	ok
1368	-1261.804	211.193	115.389	12256.069	9462.901	15484.112	157188.37	0.10	ok
1369	-1272.841	210.124	112.982	10765.299	40281.501	41695.215	157540.77	0.26	ok
1370	-1308.732	215.23	116.677	1783.192	23576.642	23643.981	158199.82	0.15	ok
1371	-1344.63	219.731	119.528	-6889.202	6483.256	9460.1117	158859.01	0.06	ok
1372	-1380.534	223.543	121.531	12337.74	8875.182	15198.312	159518.31	0.10	ok
1373	-1270.293	211.656	118.066	12141.014	40792.242	42560.677	157504.04	0.27	ok
1374	-1306.174	216.812	121.812	2756.542	23965.627	24123.636	158162.92	0.15	ok
1375	-1342.062	221.372	124.71	-6526.032	6740.902	9382.3693	158821.92	0.06	ok
1376	-1377.958	225.245	126.753	12332.748	8526.789	14993.425	159481.05	0.09	ok
1377	-1219.797	205.209	120.129	12756.875	38917.146	40954.635	156593.03	0.26	ok
1378	-1255.669	210.303	123.883	3207.956	22603.04	22829.551	157251.72	0.15	ok
1379	-1291.548	214.793	126.784	-6180.26	5899.85	8544.2287	157910.56	0.05	ok
1380	-1327.435	218.597	128.825	12459.074	8601.156	15139.63	158569.56	0.10	ok
1381	-1014.024	192.02	122.129	13327.827	35025.689	37475.724	153004.55	0.24	ok
1382	-1049.743	196.946	125.923	3640.12	19760.09	20092.577	153660.44	0.13	ok
1383	-1085.476	201.247	128.857	-5900.464	4128.998	7201.6734	154316.60	0.05	ok
1384	-1121.223	204.859	130.925	12523.72	9146.645	15508.213	154973.00	0.10	ok
1385	-1343.611	183.815	123.71	14185.309	33086.799	35999.434	158639.48	0.23	ok
1386	-1379.397	188.542	127.551	4350.392	18473.516	18978.849	159296.61	0.12	ok
1387	-1415.194	192.679	130.544	-5779.672	3490.271	6751.785	159953.94	0.04	ok
1388	-1451.002	196.163	132.669	12135.646	8232.828	14664.698	160611.48	0.09	ok
1389	-1062.548	190.946	110.44	14835.676	37054.483	39914.058	153689.62	0.26	ok
1390	-1098.48	195.541	113.479	6055.735	21874.272	22697.042	154349.43	0.15	ok
1391	-1134.417	199.596	115.844	-2895.041	6328.906	6959.6202	155009.33	0.04	ok
1392	-1170.36	203.035	117.521	11501.93	9260.736	14766.707	155669.35	0.09	ok
1393	-1104.952	177.784	260.049	48653.096	34362.723	59564.423	154472.61	0.39	ok
1395	-1140.871	182.343	263.752	27979.182	20228.915	34525.985	155132.18	0.22	ok
1396	-1176.796	186.368	266.629	7029.834	5732.793	9071.0243	155791.86	0.06	ok
1397	-1212.727	189.78	268.666	14363.457	8039.625	16460.391	156451.65	0.11	ok
1398	-1017.344	194.86	253.389	47458.094	37442.285	60449.941	152883.24	0.40	ok
1399	-1053.222	199.695	257.218	27313.691	21950.898	35041.114	153542.08	0.23	ok
1400	-1089.108	203.961	260.2	6882.236	6075.178	9180.0305	154201.03	0.06	ok
1401	-1125.001	207.579	262.317	14817.147	8253.167	16960.619	154860.14	0.11	ok
1402	-1366.871	209.203	117.28	9940.088	40616.141	41814.785	159290.57	0.26	ok
1403	-1402.798	214.014	120.896	616.344	23984.488	23992.406	159950.31	0.15	ok
1404	-1438.731	218.251	123.677	-8152.169	6988.194	10737.445	160610.14	0.07	ok
1405	-1474.67	221.838	125.623	10331.606	8175.101	13174.762	161270.07	0.08	ok
1406	-982.212	213.221	120.483	10216.368	41622.797	42858.271	152173.60	0.28	ok
1407	-1018.036	217.877	124.033	638.617	24671.753	24680.017	152831.42	0.16	ok
1408	-1053.869	221.939	126.751	-7844.406	7380.126	10770.374	153489.41	0.07	ok
1409	-1089.713	225.346	128.645	10167.628	9484.646	13904.646	154147.61	0.09	ok
1410	-1125.937	184.785	263.704	48159.734	36455.721	60401.818	154856.06	0.39	ok
1411	-1161.868	189.34	267.335	27195.291	21765.297	34832.628	155515.85	0.22	ok
1412	-1197.805	193.36	270.138	6041.246	6713.288	9031.3282	156175.74	0.06	ok
1413	-1233.746	196.768	272.11	13311.554	8417.296	15749.551	156835.73	0.10	ok
1414	-771.271	186.366	258.56	46218.322	36858.246	59115.68	148293.79	0.40	ok
1415	-807.057	190.765	262.12	25665.429	22042.147	33831.501	148950.92	0.23	ok
1416	-842.854	194.609	264.848	5793.319	6876.427	8991.5401	149608.25	0.06	ok

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1417	-878.662	197.84	266.763	13020.588	9614.873	16185.842	150265.78	0.11	ok
1418	-705.436	159.019	130.801	17688.217	27665.387	32836.666	147339.27	0.22	ok
1419	-741.217	163.448	133.347	7289.564	15023.653	16698.739	147996.29	0.11	ok
1420	-777.009	167.315	135.31	-2717.366	2035.642	3395.2785	148653.55	0.02	ok
1421	-812.813	170.565	136.688	14289.922	8773.784	16768.457	149310.99	0.11	ok
1422	-890.941	175.466	215.185	39192.157	30493.681	49657.726	150789.87	0.33	ok
1423	-926.756	179.976	217.661	22089.276	16559.076	27606.867	151447.53	0.18	ok
1434	-962.582	183.899	219.536	7630.262	2299.857	7969.3312	152105.40	0.05	ok
1435	-998.417	187.179	220.823	16959.609	10983.478	20205.572	152763.44	0.13	ok
1436	-971.122	165.435	132.111	18044.124	31913.693	36661.618	151987.75	0.24	ok
1437	-1006.986	169.236	135.9	7541.309	18762.362	20221.216	152646.31	0.13	ok
1438	-1042.857	172.596	138.852	-3255.088	5308.367	6226.906	153305.00	0.04	ok
1439	-1078.737	175.448	140.949	13549.211	7902.398	15685.312	153963.85	0.10	ok
1440	-1167.202	177.68	233.48	44333.34	34337.441	56075.885	155627.30	0.36	ok
1441	-1203.074	181.741	237.251	25771.757	20211.846	32752.132	156285.99	0.21	ok
1442	-1238.953	185.324	240.182	6923.901	5763.472	9008.7743	156944.82	0.06	ok
1443	-1274.84	188.364	242.26	15779.895	8228.567	17796.472	157603.81	0.11	ok
1444	-919.923	152.805	123.941	15916.52	28164.26	32350.597	150864.57	0.21	ok
1445	-955.701	156.488	127.747	6063.184	16016.297	17125.536	151521.55	0.11	ok
1456	-991.491	159.707	130.71	-4085.394	3575.466	5429.0332	152178.76	0.04	ok
1457	-1027.292	162.412	132.812	13567.51	8287.631	15898.495	152836.18	0.10	ok
1458	-1103.542	163.644	241.02	46274.772	30169.665	55240.956	154279.05	0.36	ok
1459	-1139.292	167.574	244.807	27116.247	17159.999	32089.818	154935.52	0.21	ok
1460	-1175.055	171.011	247.749	7686.169	3837.832	8591.0505	155592.22	0.06	ok
1461	-1210.831	173.901	249.831	16103.525	8547.267	18231.272	156249.17	0.12	ok
1462	-1121.922	182.001	260.549	49711.273	33045.05	59692.428	154653.41	0.39	ok
1463	-1157.668	186.791	264.425	28997.626	18575.983	34437.327	155309.80	0.22	ok
1515	-1193.427	190.979	267.454	7996.213	3726.101	8821.7487	155966.44	0.06	ok
1538	-1229.198	194.502	269.611	14721.752	8743.022	17122.22	156623.29	0.11	ok
1561	-1183.128	162.928	248.753	48539.181	30641.226	57401.54	156113.85	0.37	ok
1584	-1218.918	166.812	252.578	28765.287	17688.473	33768.681	156771.06	0.22	ok
1608	-1254.718	170.21	255.56	8700.134	4426.914	9761.6545	157428.46	0.06	ok
1631	-1290.53	173.068	257.678	16008.19	8083.679	17933.433	158086.05	0.11	ok
1654	-1242.537	202.883	108.57	11239.757	38749.539	40346.734	156973.36	0.26	ok
2171	-1278.407	207.758	112.263	2608.475	22620.377	22770.279	157632.05	0.14	ok
2221	-1314.285	212.066	115.134	-6312.726	6103.601	8780.9142	158290.87	0.06	ok
4988	-1350.171	215.723	117.167	11711.393	8025.445	14197.341	158949.83	0.09	ok
4989	-1094.11	200.551	249.561	47857.709	38563.675	61461.511	154282.50	0.40	ok
4990	-1129.982	205.506	253.293	28017.642	22619.9	36009.001	154941.21	0.23	ok
4991	-1165.861	209.884	256.206	7887.017	6282.138	10083.169	155600.06	0.06	ok
4992	-1201.748	213.6	258.278	14400.51	8469.025	16706.258	156259.05	0.11	ok
4993	-1069.259	206.62	244.133	47360.334	40370.739	62231.807	153836.10	0.40	ok
4994	-1105.134	211.615	247.77	27951.745	23944.437	36805.382	154494.88	0.24	ok
4995	-1141.017	216.038	250.612	8254.056	7121.04	10901.314	155153.79	0.07	ok
4996	-1176.908	219.801	252.638	14113.904	8483.977	16467.548	155812.85	0.11	ok
4997	-1058.826	201.208	232.996	45278.918	38772.173	59610.92	153662.04	0.39	ok
4998	-1094.707	206.145	236.515	26755.708	22776.151	35137.174	154320.92	0.23	ok
4999	-1130.596	210.503	239.256	7961.988	6387.63	10207.599	154979.95	0.07	ok
5000	-1166.493	214.199	241.203	13923.795	8611.225	16371.477	155639.10	0.11	ok
5001	-899.854	187.736	227.182	44476.327	34760.22	56448.353	150897.64	0.37	ok
5002	-935.62	192.515	230.643	26415.332	19835.179	33033.378	151554.40	0.22	ok
5003	-971.399	196.692	233.336	8118.418	4530.255	9296.877	152211.39	0.06	ok
5004	-1007.189	200.205	235.247	13826.723	9078.011	16540.512	152868.59	0.11	ok
5005	-1184.506	267.285	315.668	56065.661	46586.475	72894.842	155722.62	0.47	ok
5006	-1220.345	270.973	318.892	30970.065	25337.324	40014.059	156380.72	0.26	ok
5007	-1256.2	273.992	321.208	10067.562	3797.846	10760.085	157039.12	0.07	ok
5008	-1292.071	276.311	322.65	19514.935	16154.81	25333.981	157697.81	0.16	ok
5009	-984.628	185.747	237.053	46763.805	37419.728	59892.316	152321.91	0.39	ok
5010	-1020.518	189.759	240.593	27918.052	22652.808	35952.293	152980.97	0.24	ok

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5011	-1056.416	193.303	243.346	8796.195	7569.379	11604.678	153640.15	0.08	ok
5012	-1092.32	196.311	245.298	14491.859	8218.177	16659.904	154299.45	0.11	ok
5013	-1159.342	181.269	238.14	46637.641	36112.358	58984.506	155514.79	0.38	ok
5014	-1195.218	185.326	241.773	27705.529	21701.501	35193.06	156173.57	0.23	ok
5015	-1231.101	188.923	244.601	8484.841	6968.059	10979.361	156832.48	0.07	ok
5016	-1266.992	191.983	246.606	14935.771	7632.718	16773.063	157491.54	0.11	ok
5017	-1236.132	175.616	248.033	48780.096	34424.261	59703.664	156922.88	0.38	ok
5018	-1271.997	179.633	251.8	29061.464	20462.771	35542.843	157581.46	0.23	ok
5019	-1307.87	183.181	254.742	9043.393	6181.967	10954.436	158240.17	0.07	ok
5020	-1343.751	186.194	256.838	15396.386	7681.981	17206.439	158899.04	0.11	ok
5021	-1174.218	209.285	98.952	9658.357	40651.045	41782.668	155728.62	0.27	ok
5022	-1210.093	214.193	102.544	1793.018	24012.925	24079.773	156387.39	0.15	ok
5023	-1245.975	218.539	105.338	-6354.624	6984.598	9442.7674	157046.28	0.06	ok
5024	-1281.865	222.235	107.32	11307.439	8066.137	13889.591	157705.32	0.09	ok
5025	-1122.034	203.929	88.858	7844.499	39069.934	39849.666	154788.32	0.26	ok
5026	-1157.911	208.781	92.338	780.259	22857.576	22870.889	155447.12	0.15	ok
5027	-1193.796	213.064	95.038	-6555.671	6260.191	9064.5912	156106.05	0.06	ok
5028	-1229.688	216.697	96.948	11086.973	8185.749	13781.417	156765.12	0.09	ok
5029	-900.138	190.297	79.802	6204.56	35017.772	35563.196	150907.28	0.24	ok
5030	-935.873	195.002	83.236	-138.884	19889.397	19889.882	151563.47	0.13	ok
5031	-971.621	199.118	85.9	-6698.341	4386.747	8006.9546	152219.91	0.05	ok
5032	-1007.382	202.581	87.784	10882.898	8629.768	13889.218	152876.58	0.09	ok
5033	-1108.498	160.714	95.189	10278.898	28752.797	30534.883	154318.11	0.20	ok
5034	-1144.264	164.789	98.686	2714.175	15976.042	16204.958	154974.87	0.10	ok
5035	-1180.042	168.35	101.414	-5107.403	2878.22	5862.569	155631.85	0.04	ok
5036	-1215.832	171.344	103.354	11022.223	7899.037	13560.39	156289.05	0.09	ok
5037	-1075.636	181.268	97.382	10532.652	34835.324	36392.809	153912.88	0.24	ok
5038	-1111.503	185.478	100.965	2790.814	20424.479	20614.267	154571.49	0.13	ok
5039	-1147.378	189.193	103.763	-5219.507	5678.956	7713.2221	155230.26	0.05	ok
5040	-1183.261	192.343	105.756	11400.963	7869.767	13853.346	155889.17	0.09	ok
5041	-1072.504	187.931	99.551	10675.057	36811.911	38328.496	153873.32	0.25	ok
5042	-1108.373	192.187	103.19	2760.74	21871.398	22044.948	154532.00	0.14	ok
5043	-1144.251	195.955	106.022	-5440.956	6592.521	8547.8264	155190.80	0.06	ok
5044	-1180.136	199.159	108.033	12000.318	7828.308	14327.946	155849.74	0.09	ok
5045	-1097.12	185.987	108.04	12462.549	36227.417	38311.106	154331.95	0.25	ok
5046	-1132.982	190.208	111.805	3873.378	21441.437	21788.49	154990.49	0.14	ok
5047	-1168.853	193.936	114.746	-5015.106	6319.905	8067.9915	155649.17	0.05	ok
5048	-1204.731	197.099	116.84	12452.559	8011.828	14807.282	156308.00	0.09	ok
5049	-994.763	172.47	113.639	13488.612	32203.861	34914.629	152627.69	0.23	ok
5050	-1030.525	176.549	117.455	4454.326	18492.534	19021.431	153284.36	0.12	ok
5051	-1066.299	180.116	120.429	-4875.216	4456.876	6605.4125	153941.28	0.04	ok
5052	-1102.085	183.115	122.542	13151.872	8444.615	15629.564	154598.41	0.10	ok

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Column Section Designer Check

Conejo Crossover: B32 Live Load Senario

Summary

Row Labels	Max of PMMRatio
B32 Strength 5	0.414291
B32 Strength 1-2 Max	0.283971
B32 Strength 1-1 Max	0.481974

TABLE: Concrete Design 1 - Column Summary Data - ACI 318-05/IBC2003

Text	Text	Text	Text	in	Text	Unitless	Text	Text	in2/in
Frame	**DesignSect**	**DesignType**	**DesignOpt**	**Location**	**PMMCombo**	**PMMRatio**	**VMajCombo**	**VMinCombo**	**VMinRebar**
1260	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1260	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1261	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1261	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1262	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1262	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1263	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1263	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1264	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1264	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1265	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1265	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1266	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1266	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1267	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1267	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1268	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1268	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1269	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1269	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1270	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1270	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1271	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1271	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1272	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1272	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1273	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1273	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1274	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1274	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1275	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1275	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1276	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1276	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1277	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1277	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1278	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1278	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1279	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1279	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1280	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1280	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1281	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1281	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1282	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1282	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1283	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1283	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1284	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1284	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.24	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1285	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.24	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1285	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.13	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1286	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.13	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1286	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1287	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1287	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1288	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.36	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1288	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.24	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1289	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.24	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1289	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1290	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1290	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1291	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636

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1291	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1292	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.36	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1292	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.24	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1293	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.24	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1293	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1294	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1294	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1295	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1295	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1296	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1296	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1297	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1297	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1298	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1298	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1299	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1299	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1300	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1300	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1301	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1301	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1302	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1302	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1303	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1303	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1304	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.36	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1304	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1305	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1305	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1306	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1306	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1307	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1307	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1308	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.36	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1308	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1309	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1309	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1310	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1310	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1311	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1311	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1312	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1312	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1313	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1313	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1314	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1314	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1315	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1315	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1316	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1316	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1317	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1317	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1318	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1318	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1319	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 5	B32 Strength 1-2 Mi	0
1319	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1320	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.33	B32 Strength 1-2 Min	B32 Strength 1-1 M	0.0636
1320	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 1-1 M	0.0636
1321	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 1-1 M	0.0636
1321	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 1-1 M	0.0636
1322	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 1-1 M	0.0636
1322	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 1-1 M	0.0636
1323	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 1-1 M	0.0636
1323	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 1-1 M	0.0636
1324	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.33	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1324	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1325	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1325	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1326	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1326	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1327	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1327	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1328	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.33	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1328	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1329	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1329	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1330	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0

1330	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.14	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1331	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.14	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1331	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1332	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.34	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1332	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1333	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1333	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.13	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1334	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.13	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1334	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1335	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1335	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1336	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.34	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1336	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1337	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1337	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.13	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1338	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.13	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1338	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1339	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1339	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1340	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.34	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1340	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1341	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1341	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.13	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1342	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.13	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1342	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1343	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1343	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1344	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.34	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1344	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1345	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1345	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1346	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1346	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1347	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1347	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1348	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1348	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1349	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1349	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1350	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1350	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1351	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1351	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1352	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1352	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1353	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1353	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1355	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1355	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1356	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1356	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1357	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1357	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1358	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1358	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1359	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1359	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1360	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1360	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1361	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1361	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1362	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1362	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1363	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1363	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1364	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1364	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.32	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1365	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.41	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1365	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1366	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1366	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1367	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1367	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1368	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1368	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.32	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1369	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1369	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1370	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636

1370	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1371	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1371	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1372	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1372	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.32	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1373	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1373	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1374	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1374	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1375	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1375	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1376	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1376	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.32	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1377	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1377	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1378	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1378	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1379	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1379	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1380	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1380	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1381	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1381	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1382	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1382	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1383	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1383	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1384	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1384	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1385	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.41	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1385	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1386	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1386	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.22	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1387	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.22	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1387	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1388	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.21	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1388	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.32	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1389	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.33	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1389	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.22	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1390	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.22	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1390	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1391	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1391	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1392	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1392	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 1-2 Mi	0
1393	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1393	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1395	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1395	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1396	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1396	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1397	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1397	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1398	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1398	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1399	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1399	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1400	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1400	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1401	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1401	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1402	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1402	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1403	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1403	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1404	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1404	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1405	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1405	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1406	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1406	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1407	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1407	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1408	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.16	B32 Strength 5	B32 Strength 5	0.0636
1408	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 5	B32 Strength 5	0.0636
1409	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 5	B32 Strength 5	0.0636
1409	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 5	B32 Strength 5	0.0636
1410	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636

1410	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1411	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1411	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1412	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.14	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1412	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1413	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1413	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1414	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1414	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.24	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1415	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.24	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1415	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.12	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1416	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.12	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1416	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1417	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1417	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
1418	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.34	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1418	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.22	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1419	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.22	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1419	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.11	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1420	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.11	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1420	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1421	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1421	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1422	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 5	B32 Strength 5	0.0636
1422	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.24	B32 Strength 5	B32 Strength 1-2 Mi	0
1423	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.24	B32 Strength 5	B32 Strength 5	0.0636
1423	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 5	B32 Strength 5	0.0636
1434	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 5	B32 Strength 5	0.0636
1434	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 5	B32 Strength 5	0.0636
1435	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 5	B32 Strength 5	0.0636
1435	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 5	B32 Strength 5	0.0636
1436	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.35	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1436	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1437	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1437	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1438	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1438	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1439	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1439	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1440	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.36	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1440	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1441	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1441	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1442	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1442	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1443	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1443	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1444	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.35	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1444	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1445	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1445	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1456	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1456	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1457	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1457	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1458	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.37	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1458	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1459	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1459	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1460	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1460	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1461	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1461	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1462	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1462	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1463	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1463	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1515	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1515	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1538	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1538	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.32	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1561	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1561	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1584	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1584	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1608	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1608	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1631	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636

1631	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1654	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
1654	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
2171	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
2171	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
2221	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
2221	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4988	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4988	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.31	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4989	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4989	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4990	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4990	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4991	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4991	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4992	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4992	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4993	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4993	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4994	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4994	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4995	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4995	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4996	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4996	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4997	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4997	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4998	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4998	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4999	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
4999	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5000	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5000	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5001	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.36	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5001	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5002	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.25	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5002	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5003	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5003	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5004	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5004	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5005	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.48	B32 Strength 5	B32 Strength 1-1 Mi	0.0636
5005	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.34	B32 Strength 5	B32 Strength 1-1 Mi	0.0636
5006	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.34	B32 Strength 5	B32 Strength 1-1 Mi	0.0636
5006	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.20	B32 Strength 5	B32 Strength 1-1 Mi	0.0636
5007	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.20	B32 Strength 5	B32 Strength 1-1 Mi	0.0636
5007	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.23	B32 Strength 5	B32 Strength 1-1 Mi	0.0636
5008	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.23	B32 Strength 5	B32 Strength 1-1 Mi	0.0636
5008	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.41	B32 Strength 5	B32 Strength 1-1 Mi	0.0636
5009	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5009	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5010	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5010	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5011	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5011	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5012	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.15	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5012	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5013	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5013	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5014	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5014	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5015	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5015	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5016	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5016	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5017	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5017	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5018	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5018	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5019	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5019	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5020	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5020	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5021	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5021	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5022	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5022	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5023	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.20	B32 Strength 1-2 Min	B32 Strength 5	0.0636

5023	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5024	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5024	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5025	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5025	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5026	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5026	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5027	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5027	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5028	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5028	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5029	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5029	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5030	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5030	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5031	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5031	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5032	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5032	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5033	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.40	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5033	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5034	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5034	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5035	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.19	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5035	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5036	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5036	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5037	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.38	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5037	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5038	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.28	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5038	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5039	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5039	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5040	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5040	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5041	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.38	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5041	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.27	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5042	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.27	B32 Strength 1-2 Min	B32 Strength 1-1 Mi	0.0636
5042	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5043	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5043	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5044	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5044	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.29	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5045	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.39	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5045	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5046	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.27	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5046	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5047	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.18	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5047	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5048	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.16	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5048	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5049	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.37	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5049	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-1 Max	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5050	Conejo Column 6ft	Column	Check	0	B32 Strength 1-1 Max	0.26	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5050	Conejo Column 6ft	Column	Check	79.5	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5051	Conejo Column 6ft	Column	Check	0	B32 Strength 1-2 Max	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5051	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5052	Conejo Column 6ft	Column	Check	0	B32 Strength 5	0.17	B32 Strength 1-2 Min	B32 Strength 5	0.0636
5052	Conejo Column 6ft	Column	Check	79.5	B32 Strength 5	0.30	B32 Strength 1-2 Min	B32 Strength 5	0.0636

Column Capacity Plot - Crossover

Conejo Crossover: B32 Live Load Senario

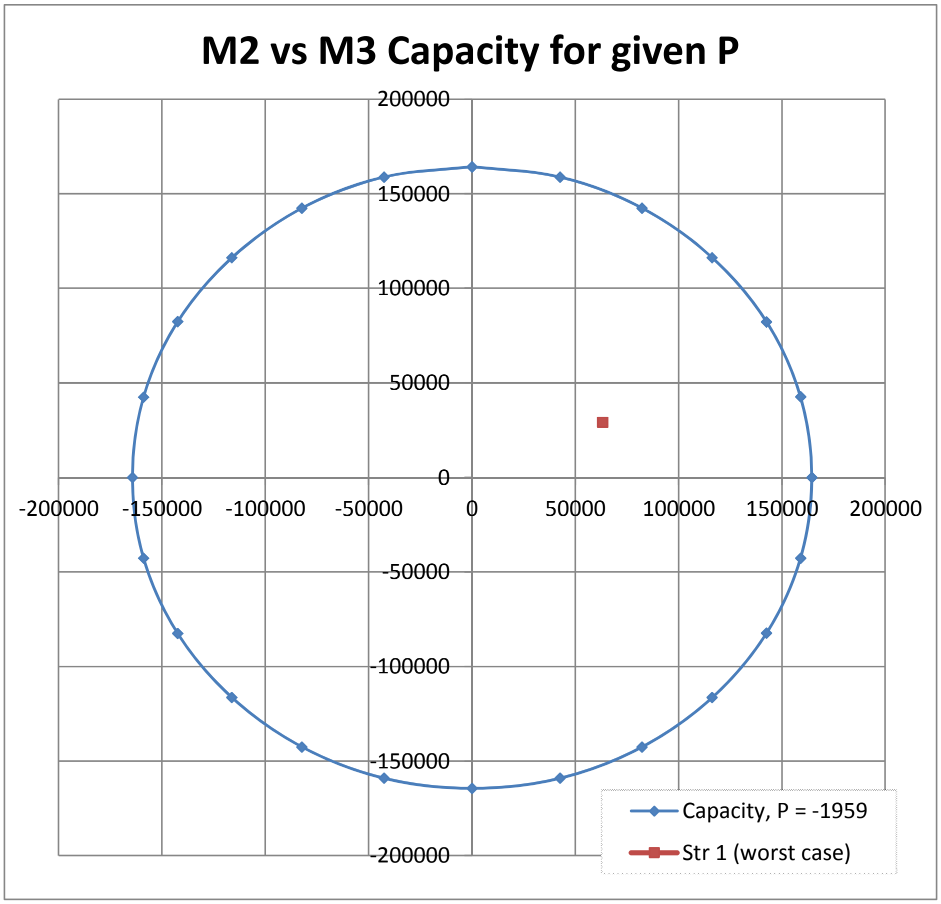
Strength 1

P	-1959	kips
M2	63256	kip-in
M3	29382	kip-in

Loads from most onerous load case and column section as identified by SAP section designer - see Column Strength Calculations (1)

6ft dia Column Capacity for P = -1959

Angle	M2 (kip-in)	M3 (kip-in)
0	-48	164333
15	42626	158937
30	82277	142525
45	116185	116309
60	142513	82305
75	158957	42629
90	164363	0
105	158957	-42629
120	142513	-82305
135	116185	-116309
150	82277	-142525
165	42626	-158937
180	-48	-164333
195	-42550	-158968
210	-82340	-142469
225	-116201	-116228
240	-142487	-82388
255	-158969	-42586
270	-164332	0
285	-158969	42586
300	-142487	82388
315	-116201	116228
330	-82340	142469
345	-42550	158968
0	-48	164333



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

Column Capacity Plot - Viaduct

Conejo Crossover: B32 Live Load Senario

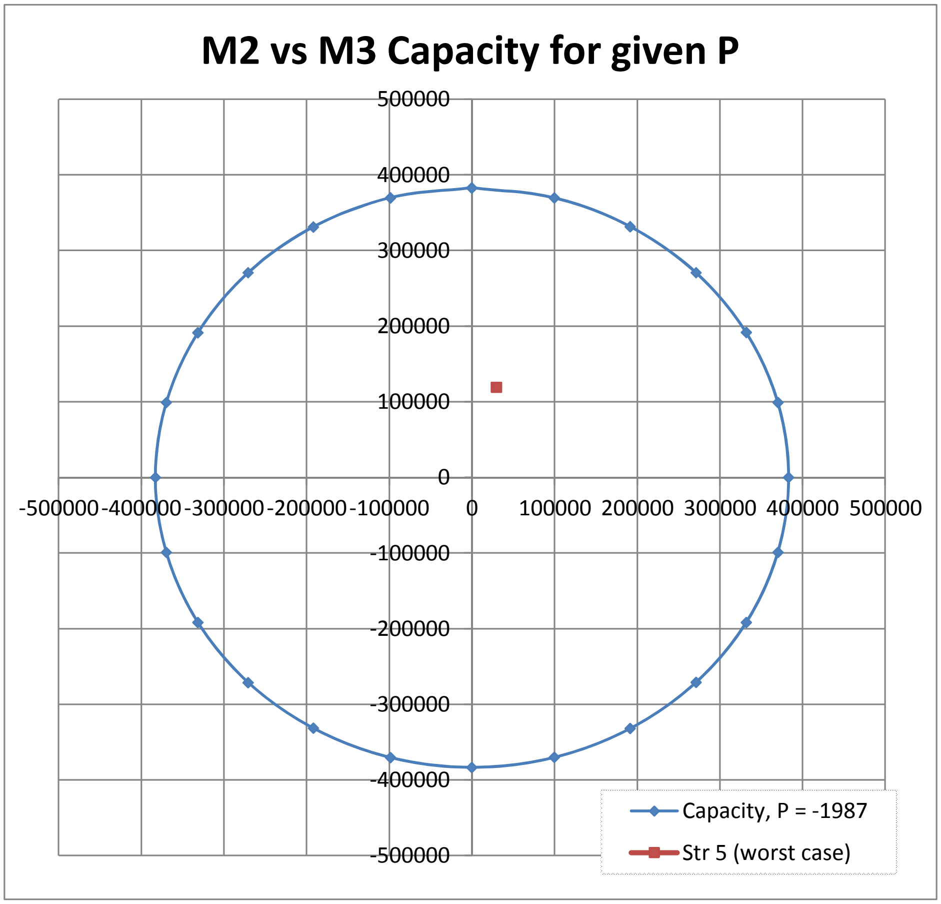
Strength 1

P	-1987	kips
M2	29358	kip-in
M3	119299	kip-in

Loads from most onerous load case and column section as identified by SAP section designer - see Column Strength Calculations (1)

10ft dia Column Capacity for P = -1987

	kip-in	kip-in
Angle	M2	M3
0	-444	383160
15	99532	369863
30	191264	331783
45	271009	270774
60	331551	191567
75	369951	99019
90	382995	0
105	369951	-99019
120	331551	-191567
135	271009	-270774
150	191264	-331783
165	99532	-369863
180	-444	-383160
195	-98674	-370050
210	-191937	-331448
225	-270724	-271006
240	-331693	-191444
255	-369875	-98980
270	-383106	0
285	-369875	98980
300	-331693	191444
315	-270724	271006
330	-191937	331448
345	-98674	370050
0	-444	383160



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

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Pile Capacity Output - Crossover

Conejo Crossover: B32 Live Load Senario

9ft diameter mono-pile shaft (1% reinforcement) using expected material properties

Pile 1 (M2)

P	-1051	kips
M2	194340	kip-in
M3	0	kip-in

Pile 1 (M3)

P	-1051
M2	0
M3	194340

Pile 1 (M2 & M3)

P	-1051
M2	137419
M3	137419

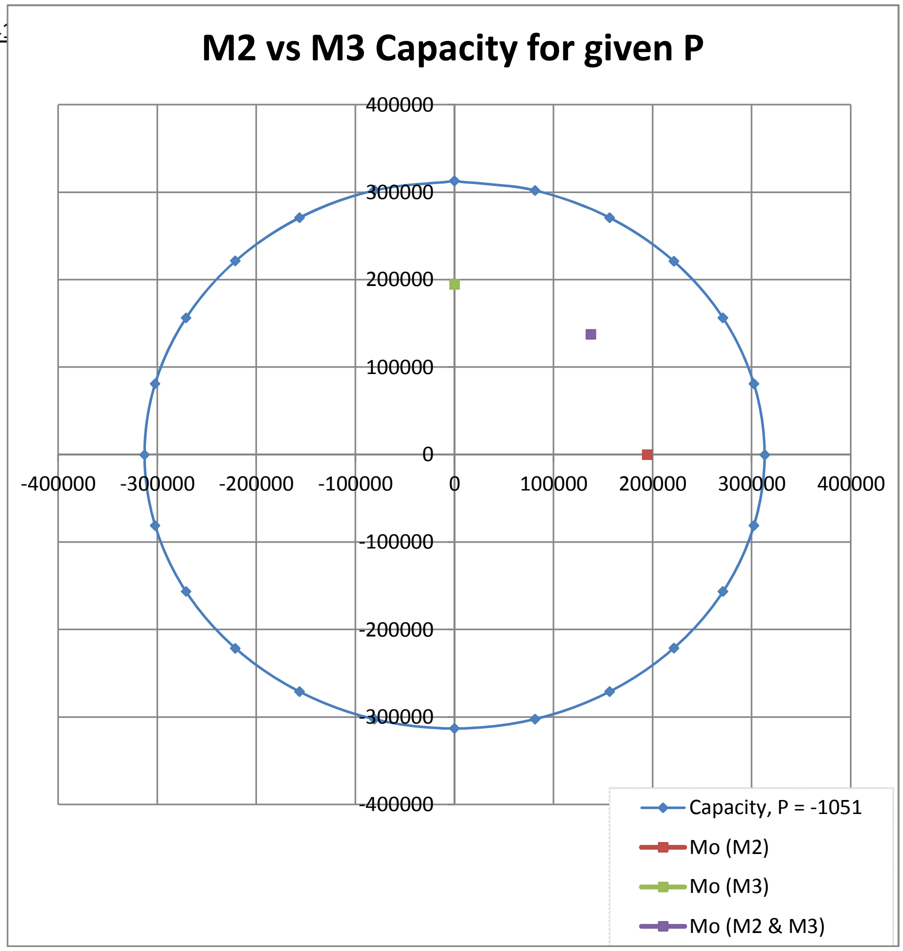
Moments are derived from column overstrength moment M_o and associated overstrength shear V_o (CSDC 4.3.1)

Axial load, P is taken as the push/pull force on the tension pile subtracted by the column load used for M_o

Note: P is tension-positive

9ft dia Pile Capacity for P = -1051.441

	kip-in	kip-in
Angle	M2	M3
0	-172	312953
15	81097	302159
30	156456	270986
45	221338	221219
60	270958	156504
75	302207	80932
90	312975	0
105	302207	-80932
120	270958	-156504
135	221338	-221219
150	156456	-270986
165	81097	-302159
180	-172	-312953
195	-80781	-302291
210	-156539	-270867
225	-221282	-221362
240	-270952	-156397
255	-302250	-80989
270	-312924	0
285	-302250	80989
300	-270952	156397
315	-221282	221362
330	-156539	270867
345	-80781	302291
0	-172	312953



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

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Pile Capacity Output - Viaduct

Conejo Crossover: B32 Live Load Senario

Worst case in column location next to crossover structure with only 2no. piles. Consider this case only

Pile 1 (M2)

P	268	kips
M2	0	kip-in
M3	112522	kip-in

Pile 1 (M3)

P	-989
M2	311211
M3	12414

Pile 1 (M2 & M3)

P	-100
M2	220049
M3	83197

Pile 2 (M2)

P	-2245	kips
M2	0	kip-in
M3	87695	kip-in

Pile 2 (M3)

P	-989
M2	311211
M3	-12414

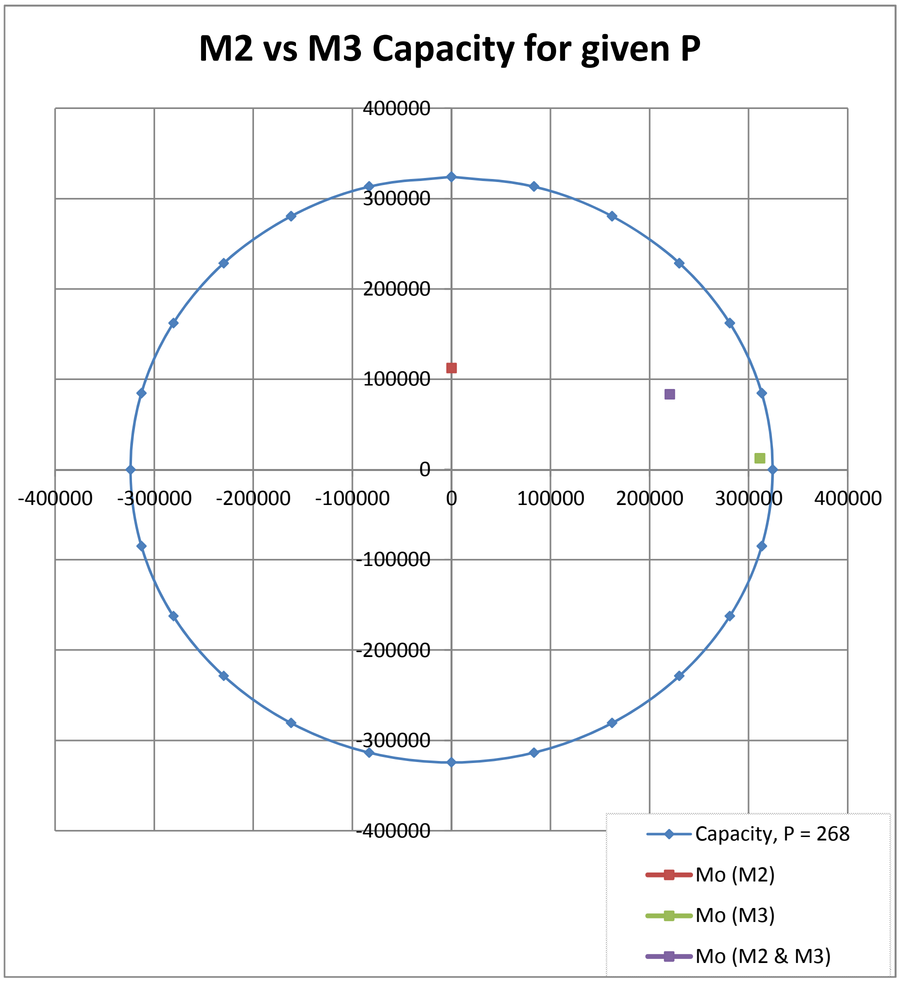
Pile 2 (M2 & M3)

P	-1877
M2	220049
M3	58370

Moments are derived from column overstrength moment M_o and associated overstrength shear V_o (CSDC 4.3.1)
Axial load, P is taken as the push/pull force on the tension pile subtracted by the column load used for M_o
Note: P is tension-positive

6.5ft Pile Capacity for P = 267.661

	kip-in	kip-in
Angle	M2	M3
0	0	324260
15	83058	313547
30	162058	280663
45	229964	228691
60	280853	162166
75	313076	84815
90	324056	0
105	313076	-84815
120	280853	-162166
135	229964	-228691
150	162058	-280663
165	83058	-313547
180	0	-324260
195	-83058	-313547
210	-162058	-280663
225	-229964	-228691
240	-280853	-162166
255	-313076	-84815
270	-324056	0
285	-313076	84815
300	-280853	162166
315	-229964	228691
330	-162058	280663
345	-83058	313547
0	0	324260



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

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Dowel Strength Calculations

Conejo Crossover: B32 Live Load Senario

Maximum

Row Labels	Max of P	Max of V2	Max of V3	Max of T	Max of M2	Max of M3
B32 Strength 1-1 Max	0	0	826.708	0	2333.236	0
B32 Strength 5	0	0	314.112	0	1588.324	0
B32 Strength 1-2 Max	0	0	1299.258	0	3844.427	0
B32 Strength 1-1 Min	0	0	871.063	0	2506.115	0
B32 Strength 1-2 Min	0	0	1260.342	0	3688.272	0

Minimum

Row Labels	Min of P	Min of V2	Min of V3	Min of T	Min of M2	Min of M3
B32 Strength 1-1 Max	0	0	-555.587	0	-3333.066	0
B32 Strength 5	0	0	-186.81	0	-2547.665	0
B32 Strength 1-2 Max	0	0	-1089.361	0	-6584.585	0
B32 Strength 1-1 Min	0	0	-594.502	0	-3503.334	0
B32 Strength 1-2 Min	0	0	-1045.006	0	-6344.115	0

Input

Dowel diameter	12	in	AASHTO LRFD 2007
E	29000	kip/in2	
I	1017.876	in4	
Zp	288	in4	
Fy	50	kip/in2	
Resistance Factor	0.8		6.5.4.2

Flexure

Mn (elastic)	8482	kip-in	AASHTO LRFD C6.12.2.2.3
Mr	6786	kip-in	taking elastic modulus, not plastic (conservative)
M	6585	kip-in	
D/C	0.97	ok	

Shear

Vn	3280	kips	AASHTO LRFD C6.13.5.3
Vr	2624	kips	
V	1299	kips	
D/C	0.50	ok	

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Column Strength Calculations (1)

Conejo Crossover: B42 Live Load Senario

Strength 1

Loads from most onerous column, as identified by the SAP Section Design check

Description	Units	Reference	Crossover	Viaduct
CSiBridge Model			Conejo Force B42	Conejo Force B42
Axial	k	CSiBridge	1989.794	2145.249
Shear V2	k	CSiBridge	165.55	357.71
Moment M3	k-in	CSiBridge	29255.386	111522.385
Shear V3	k	CSiBridge	306.738	114.028
Moment M2	k-in	CSiBridge	65674.458	28318.886

Φ Flexure		(CSDC 3.2.1 per TM 2.10.4)	1.00	1.00
Φ Shear		(CSDC 3.2.1 per TM 2.10.4)	0.90	0.90

Column Shear Capacity

Description	Units	Reference	Crossover	Viaduct
A_e = .8 x A_g	in^2	(CSDC 3.6.2 per TM 2.10.4)	3257	9048
ρ_s x f_{yh}	ksi		1.50	0.85
ρ_s x f_{yh} ≤ .35	ksi		0.35	0.35
μ_d max			1.5	1.5
Factor 1 = ρ_s x f_{yh} / .15 ksi + 3.67 - μ_d			4.52	4.50
.3 ≤ Factor 1 ≤ 3			3.00	3.00
Factor 2 (Assume Pc=0 except B35)			1	2
v_c Inside Plastic Hinge Zone=Factor 1 x Factor 2 x fc' ^.5	psi		212	424
v_c Inside Plastic Hinge Zone ≤ 4 fc'^.5	psi		212	283
v_c Outisde Plastic Hinge Zone=3 x Factor 2 x fc' ^.5	psi		212	424
v_c Outisde Plastic Hinge Zone ≤ 4 fc'^.5	psi		212	283
V_c = v_c x A_e		(CSDC 3.6.2 per TM 2.10.4)		
V_c Inside PH Zone =	k		691	2559
V_c Outwide PH Zone =	k		691	2559

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$A_v = n \times (\pi/2) \times A_b$	in^2	(CSDC 3.6.3 per TM 2.10.4) 2 hoops	2.48	42.73
Min A_v = .025 x D' x s / f_{yh}	in^2	(CSDC 3.6.5 per TM 2.10.4)	0.11	0.19
			Min OK	**Min OK**
$V_s = A_v \times f_{yh} \times D' / s \leq 8 \times fc'^{.5} \times A_e$	k		1843	5118
$\Phi V_n = V_c + V_s$	k	(CSDC 3.6.1 per TM 2.10.4)		
ΦVn^{col} Inside PH Zone	k		2280	6910
ΦVn^{col} Outside PH Zone	k		2280	6910

Column Force Demand

Description	Units	Reference	Crossover	Viaduct
Extreme DL	k		2000	2000
M_p^{col} (Caltrans Idealized)	k-in	CSiBridge Section Design	194340	476606
$M_o^{col} = 1.2 \times M_p^{col}$	k-in	(CSDC Eq. 4.4 per TM 2.10.4)	194340	476606
$V_o^{col} = M_o^{col} / L$	k		611	1499
Vmax (SRSS)			349	375
ΦVn Inside PH Zone	k		2280	6910
ΦVn Outside PH Zone	k		2280	6910
$\Phi V_n^{col} \geq V_o^{col}$		(CSDC 3.6 per TM 2.10.4)	**Vn OK**	**Vn OK**
Axial DL	k	CSiBridge	1990	2145
$Md = \sqrt{(M2^2+M3^2)}$	k-in		71896	115062
Mn	k-in	CSiBridge	164497	389783
$\Phi M_n^{col} \geq M_o^{col}$		CSiBridge	**Mn OK**	**Mn OK**

Column Strength Calculations (2)

Conejo Crossover: B42 Live Load Senario

Summary

Row Labels	Max of P (kips)	Max of V2 (kips)	Max of V3 (kips)	Max of M2 (kip-in)	Max of M3 (kip-in)	Min of P (kips)
B42 Strength 1-1 Max	-1043.744	205.343	305.194	65482.642	35939.757	-2285.477
B42 Strength 1-2 Max	-838.888	148.569	199.173	53780.523	30471.045	-2367.703
B42 Strength 1-1 Min	-765.408	202.344	256.698	54085.188	35027.818	-1768.525
B42 Strength 1-2 Min	-560.054	124.008	152.22	42574.886	23620.339	-1803.784
B42 Strength 5	-729.965	266.462	318.54	55437.131	44941.256	-1868.731

Max D/C
0.465

Strength 1: All Column Sections

OutputCase (All)

Str5 Identified as worst case by SAP section check

Row Labels	Max of P 0	Max of V2 0	Max of V3 0	Max of M2 0	Max of M3 0	[M] kip-in	M kip-in	D/C	
1260	-912.007	183.92	249.277	46192.926	36128.751	58643.611	157743.55	0.37	ok
1261	-937.97	188.85	253	26376.426	21507.099	34033.383	158405.71	0.21	ok
1262	-963.933	193.218	255.883	12361.516	6493.561	13963.288	159067.87	0.09	ok
1263	-989.896	196.936	257.918	13801.858	8169.293	16038.349	159730.03	0.10	ok
1264	-906.559	182.156	244.563	45552.324	35606.183	57817.078	157494.25	0.37	ok
1265	-932.522	187.086	248.226	26109.589	21124.756	33585.204	158156.41	0.21	ok
1266	-958.485	191.454	251.062	13144.87	6251.422	14555.682	158818.58	0.09	ok
1267	-984.448	195.171	253.062	13494.091	8079.988	15728.213	159480.74	0.10	ok
1268	-887.345	175.891	236.168	44437.372	33647.55	55739.014	161128.98	0.35	ok
1269	-913.308	180.593	239.765	25662.049	19664.206	32329.89	161791.14	0.20	ok
1270	-939.271	184.7	242.551	13866.892	5307.042	14847.74	162453.30	0.09	ok
1271	-965.235	188.153	244.516	13211.027	9367.382	16195.033	163115.46	0.10	ok
1272	-806.572	164.07	230.922	43461.173	30990.237	53378.538	158203.59	0.34	ok
1273	-832.535	168.543	234.507	25103.014	17946.706	30858.476	158865.75	0.19	ok
1274	-858.498	172.45	237.284	13184.719	4547.569	13946.942	159527.91	0.09	ok
1275	-884.461	175.733	239.246	13015.945	8773.013	15696.515	160190.07	0.10	ok
1276	-879.213	173.621	229.024	43141.749	33860.165	54842.696	156674.10	0.35	ok
1277	-905.177	178.25	232.64	24937.862	20057.27	32002.985	157336.26	0.20	ok
1278	-931.14	182.335	235.445	12469.706	5886.384	13789.238	157998.42	0.09	ok
1279	-957.103	185.799	237.429	12932.678	8177.809	15301.331	158660.58	0.10	ok
1280	-874.986	174.798	230.482	43672.255	34229.731	55488.2	156678.31	0.35	ok
1281	-900.949	179.481	234.157	25348.966	20333.298	32496.355	157340.47	0.21	ok
1282	-926.913	183.627	237.016	12337.313	6064.585	13747.308	158002.63	0.09	ok
1283	-952.876	187.154	239.044	12867.582	7859.847	15078.192	158664.79	0.10	ok
1284	-787.666	158.053	228.79	43175.908	29228.761	52139.04	157536.40	0.33	ok
1285	-813.629	162.53	232.607	24987.087	16663.519	30033.771	158198.56	0.19	ok
1286	-839.592	166.442	235.576	11952.106	3742.36	12524.3	158860.72	0.08	ok
1287	-865.555	169.73	237.681	13148.912	8433.895	15621.283	159522.88	0.10	ok
1288	-1256.34	176.198	236.796	49770.22	34754.909	60704.024	168997.43	0.36	ok
1289	-1292.228	180.145	240.568	33125.99	20771.167	39099.522	169659.59	0.23	ok
1290	-1328.124	183.633	243.501	18705.073	6479.272	19795.472	170321.75	0.12	ok
1291	-1364.026	186.592	245.581	15881.285	7895.515	17735.681	170983.91	0.10	ok
1292	-1260.159	175.595	235.382	51895.756	34570.542	62356.169	169405.59	0.37	ok
1293	-1296.039	179.508	239.119	34364.229	20621.656	40076.838	170067.75	0.24	ok
1294	-1331.926	182.956	242.023	19111.893	6359.284	20142.119	170729.92	0.12	ok
1295	-1367.821	185.873	244.079	15836.225	8260.874	17861.357	171392.08	0.10	ok
1296	-1273.778	173.852	236.62	54264.566	33953.372	64011.519	173868.16	0.37	ok
1297	-1309.587	177.661	240.347	35784.065	20138.026	41061.41	174530.32	0.24	ok
1298	-1345.407	180.986	243.242	19842.73	6848.6	20991.361	175192.48	0.12	ok
1299	-1381.236	183.776	245.291	15817.856	9206.968	18302.263	175854.64	0.10	ok
1300	-1241.22	174.482	231.658	51819.24	32888.31	61374.869	172624.31	0.36	ok

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1301	-1277.023	178.522	235.187	34642.29	19026.039	39523.138	173286.47	0.23	ok
1302	-1312.837	182.055	237.938	22406.086	4903.303	22936.326	173948.63	0.13	ok
1303	-1348.661	185.029	239.896	15296.056	9993.785	18271.428	174610.79	0.10	ok
1304	-1368.263	190.924	221.746	53663.563	37562.654	65503.671	171117.09	0.38	ok
1305	-1404.198	195.117	221.746	36034.787	22384.2	42421.201	171779.25	0.25	ok
1306	-1440.138	198.816	221.746	22756.3	6904.529	23780.7	172441.41	0.14	ok
1307	-1476.084	201.952	221.768	14327.897	9796.043	17356.586	173103.57	0.10	ok
1308	-1425.355	197.775	226.203	55323.24	39362.7	67897.592	172071.74	0.39	ok
1309	-1461.296	202.048	226.203	37340.082	23639.553	44194.006	172733.90	0.26	ok
1310	-1497.243	205.827	226.203	23160.083	7598.955	24374.855	173396.06	0.14	ok
1311	-1533.194	209.038	226.203	14653.636	9743.433	17597.259	174058.22	0.10	ok
1312	-1452.93	197.361	229.137	56689.419	39020.674	68820.805	172873.43	0.40	ok
1313	-1488.871	201.656	229.137	38473.051	23330.472	44994.295	173535.59	0.26	ok
1314	-1524.817	205.453	229.137	23674.195	7308.228	24776.556	174197.76	0.14	ok
1315	-1560.768	208.676	229.137	15545.494	9778.997	18365.488	174859.92	0.11	ok
1316	-1400.615	185.888	223.66	56027.731	35369.213	66257.738	171554.49	0.39	ok
1317	-1436.571	190.157	226.034	38246.724	20591.086	43437.365	172216.65	0.25	ok
1318	-1472.531	193.912	227.995	23948.051	5487.416	24568.697	172878.81	0.14	ok
1319	-1508.495	197.085	229.359	16424.465	9761.098	19106.075	173540.98	0.11	ok
1320	-973.616	158.934	110.868	13777.664	30052.561	33060.255	158671.75	0.21	ok
1321	-999.579	162.909	113.485	4963.626	17417.286	18110.755	159333.91	0.11	ok
1322	-1025.542	166.416	115.509	-3961.263	4466.774	5970.2324	159996.07	0.04	ok
1323	-1051.506	169.389	116.936	13013.965	7857.176	15201.924	160658.23	0.09	ok
1324	-994.438	170.182	98.405	11781.358	33359.95	35379.184	159210.60	0.22	ok
1325	-1020.401	174.215	101.007	3961.086	19830.501	20222.24	159872.76	0.13	ok
1326	-1046.365	177.788	103.024	-4016.308	5981.856	7205.0906	160534.92	0.04	ok
1327	-1072.328	180.828	104.45	11654.159	8008.217	14140.402	161197.08	0.09	ok
1328	-968.203	171.983	94.787	11290.385	33880	35711.723	158654.61	0.23	ok
1329	-994.166	176.018	97.54	3754.84	20208.222	20554.101	159316.77	0.13	ok
1330	-1020.13	179.593	99.68	-3956.964	6216.062	7368.6492	159978.93	0.05	ok
1331	-1046.093	182.636	101.195	11092.138	8104.103	13737.249	160641.10	0.09	ok
1332	-917.342	153.222	120.21	15895.393	28301.457	32459.76	160945.00	0.20	ok
1333	-943.305	157.083	123.754	6338.705	16120.308	17321.764	161607.16	0.11	ok
1334	-969.268	160.457	126.515	-3445.839	3632.17	5006.6421	162269.32	0.03	ok
1335	-995.232	163.293	128.477	12786.476	8627.243	15424.762	162931.48	0.09	ok
1336	-962.328	156.431	129.133	17345.335	29925.349	34588.83	161354.08	0.21	ok
1337	-988.291	160.082	132.873	7082.404	17489.117	18868.748	162016.24	0.12	ok
1338	-1014.254	163.272	135.782	-3452.036	4762.57	5882.0596	162678.40	0.04	ok
1339	-1040.217	165.953	137.845	13434.815	8327.498	15806.375	163340.57	0.10	ok
1340	-940.49	160.302	130.145	17579.178	31124.435	35745.74	157709.47	0.23	ok
1341	-966.453	164.078	133.899	7232.673	18380.42	19752.25	158371.63	0.12	ok
1342	-992.416	167.411	136.821	-3393.279	5336.195	6323.7109	159033.79	0.04	ok
1343	-1018.379	170.236	138.893	13498.774	7510.609	15447.529	159695.95	0.10	ok
1344	-928.416	162.249	130.936	17758.402	31717.91	36350.882	157425.45	0.23	ok
1345	-954.379	166.066	134.725	7348.985	18819.144	20203.162	158087.61	0.13	ok
1346	-980.342	169.446	137.677	-3352.551	5616.867	6541.3143	158749.77	0.04	ok
1347	-1006.306	172.319	139.773	13545.35	7272.73	15374.3	159411.93	0.10	ok
1348	-1171.929	194.926	107.544	9239.589	37676.276	38792.677	165134.94	0.23	ok
1349	-1197.893	200.064	111.247	689.877	22179.645	22190.371	165797.10	0.13	ok
1350	-1223.856	204.606	114.106	-7600.989	6289.439	9865.702	166459.26	0.06	ok
1351	-1249.819	208.461	116.114	10996.859	8554.73	13932.491	167121.42	0.08	ok
1352	-1187.857	191.556	100.042	7905.444	36746.366	37587.118	165177.79	0.23	ok
1353	-1213.821	196.688	103.684	-35.803	21517.643	21517.673	165839.95	0.13	ok
1355	-1239.784	201.225	106.494	-7668.557	5896.264	9673.2981	166502.11	0.06	ok
1356	-1265.747	205.075	108.465	10625.953	8386.845	13536.988	167164.28	0.08	ok
1357	-1173.958	188.312	96.64	7661.449	35816.596	36626.853	164704.46	0.22	ok
1358	-1199.922	193.373	100.267	-16.091	20845.806	20845.812	165366.62	0.13	ok
1359	-1225.885	197.83	103.073	-7542.287	5490.664	9329.1738	166028.78	0.06	ok
1360	-1251.848	201.601	105.059	10311.084	8685.703	13481.836	166690.94	0.08	ok
1361	-1185.408	186.513	91.235	6860.692	35264.243	35925.422	168314.74	0.21	ok
1362	-1211.371	191.416	94.848	-380.509	20436.427	20439.969	168976.90	0.12	ok
1363	-1237.334	195.693	97.65	-7436.292	5258.963	9107.9707	169639.06	0.05	ok

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1364	-1263.298	199.282	99.631	10226.198	9715.427	14105.483	170301.22	0.08	ok
1365	-1052.417	167.837	91.944	7386.413	31084.193	31949.744	164748.27	0.19	ok
1366	-1078.38	172.442	95.531	78.42	17741.673	17741.846	165410.43	0.11	ok
1367	-1104.343	176.458	98.312	-7383.644	4032.796	8413.1826	166072.59	0.05	ok
1368	-1130.306	179.829	100.277	10195.571	8915.142	13543.612	166734.75	0.08	ok
1369	-1112.817	177.845	96.141	8659.621	34114.782	35196.696	163207.34	0.22	ok
1370	-1138.78	182.603	99.757	1031.146	19980.033	20006.623	163869.50	0.12	ok
1371	-1164.744	186.792	102.565	-6675.803	5467.242	8628.8516	164531.66	0.05	ok
1372	-1190.707	190.336	104.553	10172.136	8340.852	13154.549	165193.82	0.08	ok
1373	-1103.076	178.715	99.904	9839.333	34428.997	35807.378	163074.97	0.22	ok
1374	-1129.04	183.521	103.594	1896.93	20227.632	20316.384	163737.13	0.12	ok
1375	-1155.003	187.768	106.472	-6188.994	5646.503	8377.7469	164399.29	0.05	ok
1376	-1180.966	191.372	108.52	10133.635	7999.943	12910.834	165061.45	0.08	ok
1377	-1083.578	173.074	102.267	10506.586	32784.706	34427.101	162466.17	0.21	ok
1378	-1109.541	177.816	106	2385.236	19033.838	19182.709	163128.33	0.12	ok
1379	-1135.505	181.995	108.909	-5876.121	4911.512	7658.4429	163790.49	0.05	ok
1380	-1161.468	185.531	110.977	10279.274	8062.661	13064.072	164452.65	0.08	ok
1381	-994.177	162.203	106.027	11415.866	29572.501	31699.445	162874.74	0.19	ok
1382	-1020.14	166.791	109.864	2986.733	16678.138	16943.461	163536.90	0.10	ok
1383	-1046.104	170.795	112.859	-5567.717	3439.565	6544.4694	164199.06	0.04	ok
1384	-1072.067	174.155	114.994	10454.709	8571.379	13519.226	164861.22	0.08	ok
1385	-1215.107	152.641	106.775	11693.306	27348.594	29743.554	168632.91	0.18	ok
1386	-1241.07	156.936	110.637	3204.703	15213.657	15547.523	169295.07	0.09	ok
1387	-1267.034	160.691	113.653	-5590.952	2737.27	6225.0616	169957.23	0.04	ok
1388	-1292.997	163.851	115.801	10479.411	7428.721	12845.386	170619.39	0.08	ok
1389	-970.542	167.107	101.716	12582.461	32425.305	34781.011	158413.70	0.22	ok
1390	-996.505	171.089	104.789	4496.158	19141.491	19662.454	159075.86	0.12	ok
1391	-1022.468	174.607	107.181	-3777.521	5540.321	6705.5814	159738.02	0.04	ok
1392	-1048.432	177.594	108.877	11687.404	8292.182	14330.237	160400.18	0.09	ok
1393	-911.246	179.151	242.883	45693.433	34686.949	57367.885	157446.31	0.36	ok
1395	-937.209	184.013	246.529	26384.257	20444.438	33378.197	158108.47	0.21	ok
1396	-963.172	188.303	249.359	13505.067	5815.423	14703.944	158770.63	0.09	ok
1397	-989.135	191.94	251.359	13226.421	8400.406	15668.6	159432.79	0.10	ok
1398	-879.706	169.244	227.05	42817.467	32579.454	53802.94	156607.19	0.34	ok
1399	-905.67	173.874	230.77	24766.974	19124.547	31291.393	157269.35	0.20	ok
1400	-931.633	177.961	233.661	12058.408	5301.547	13172.38	157931.51	0.08	ok
1401	-957.596	181.426	235.709	12960.022	7939.274	15198.495	158593.67	0.10	ok
1402	-1019.645	201.231	121.617	12247.342	39407.368	41266.67	161932.77	0.25	ok
1403	-1045.608	206.303	125.341	2586.467	23411.048	23553.492	162594.93	0.14	ok
1404	-1071.571	210.77	128.204	-5767.827	7030.518	9093.7347	163257.09	0.06	ok
1405	-1097.535	214.547	130.206	11805.028	9340.459	15053.334	163919.25	0.09	ok
1406	-627.527	204.645	132.387	14516.678	40277.486	42813.664	156493.60	0.27	ok
1407	-653.49	209.554	136.122	3998.506	24012.741	24343.372	157155.76	0.15	ok
1408	-679.453	213.839	138.978	-3760.57	7375.397	8278.7902	157817.92	0.05	ok
1409	-705.417	217.442	140.966	12601.176	10700.018	16531.183	158480.08	0.10	ok
1410	-855.465	187.02	241.975	43682.565	37010.025	57253.021	156420.51	0.37	ok
1411	-881.428	191.879	245.723	24445.589	22141.957	32982.618	157082.67	0.21	ok
1412	-907.391	196.168	248.616	9803.048	6887.554	11980.741	157744.83	0.08	ok
1413	-933.354	199.806	250.65	14177.933	8804.031	16689.061	158406.99	0.11	ok
1414	-560.054	188.079	233.374	40821.961	37248.619	55262.031	153347.03	0.36	ok
1415	-586.018	192.774	237.134	22268.722	22296.371	31512.286	154009.19	0.20	ok
1416	-611.981	196.875	240.02	8146.361	6972.98	10723.136	154671.35	0.07	ok
1417	-637.944	200.323	242.037	14579.443	10002.634	17680.861	155333.51	0.11	ok
1418	-680.738	136.468	128.558	16601.068	23423.877	28710.163	155913.41	0.18	ok
1419	-706.702	140.307	131.286	6380.728	12574.682	14100.933	156575.57	0.09	ok
1420	-732.665	143.659	133.384	-3430.923	1428.216	3716.3199	157237.73	0.02	ok
1421	-758.628	146.475	134.854	14736.828	7731.908	16642.01	157899.89	0.11	ok
1422	-989.986	160.392	233.939	51215.483	27589.69	58174.021	166094.77	0.35	ok
1423	-1025.825	164.546	236.641	35329.857	14838.544	38319.462	166756.93	0.23	ok
1434	-1061.673	168.159	238.697	22920.902	1788.143	22990.546	167419.09	0.14	ok
1435	-1097.529	171.18	240.117	17816.319	9760.509	20314.742	168081.26	0.12	ok
1436	-969.926	158.862	128.519	17089.375	30709.112	35143.937	158156.65	0.22	ok

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1437	-995.889	162.636	132.333	6872.403	18079.56	19341.676	158818.81	0.12	ok
1438	-1021.853	165.965	135.305	-3646.054	5150.027	6310.0307	159480.97	0.04	ok
1439	-1047.816	168.787	137.417	13621.249	7448.911	15524.97	160143.13	0.10	ok
1440	-1213.274	169.335	239.243	49015.252	33041.968	59112.322	168085.77	0.35	ok
1441	-1249.146	173.262	243.035	32793.435	19579.826	38193.965	168747.93	0.23	ok
1442	-1285.025	176.729	245.984	19287.285	5805.468	20142.066	169410.09	0.12	ok
1443	-1320.912	179.669	248.075	16052.752	7981.605	17927.545	170072.25	0.11	ok
1444	-927.469	146.565	124.661	15930.063	27053.038	31394.805	161045.00	0.19	ok
1445	-963.251	150.214	128.513	6020.044	15401.131	16535.893	161707.16	0.10	ok
1456	-999.045	153.4	131.515	-4191.002	3459.145	5434.168	162369.32	0.03	ok
1457	-1034.85	156.078	133.646	13726.087	7801.325	15788.164	163031.48	0.10	ok
1458	-1105.372	155.159	244.889	50282.031	28834.633	57963.081	169041.59	0.34	ok
1459	-1141.124	158.96	248.728	33807.328	16499.86	37618.889	169703.75	0.22	ok
1460	-1176.889	162.283	251.71	20862.937	3863.476	21217.648	170365.91	0.12	ok
1461	-1212.667	165.077	253.823	16320.825	8239.937	18282.94	171028.07	0.11	ok
1462	-1023.343	152.924	237.56	45634.945	27642.325	53353.972	163195.92	0.33	ok
1463	-1049.306	157.265	241.42	26748.907	15485.261	30907.885	163858.08	0.19	ok
1515	-1075.269	161.059	244.434	13041.222	2983.229	13378.084	164520.24	0.08	ok
1538	-1101.232	164.25	246.58	13204.311	8010.149	15443.973	165182.40	0.09	ok
1561	-1193.91	156.17	250.601	57216.455	29425.21	64339.457	170841.52	0.38	ok
1584	-1229.698	160.137	254.473	37998.587	17009.673	41631.978	171503.68	0.24	ok
1608	-1265.497	163.608	257.492	21618.51	4282.635	22038.624	172165.84	0.13	ok
1631	-1301.307	166.53	259.64	16074.512	7933.505	17925.692	172828.01	0.10	ok
1654	-1081.777	169.389	96.287	9532.874	32325.813	33702.135	162413.23	0.21	ok
2171	-1107.74	173.826	100.03	1878.067	18859.381	18952.662	163075.39	0.12	ok
2221	-1133.704	177.744	102.947	-6074.345	5040.224	7893.1315	163737.55	0.05	ok
4988	-1159.667	181.069	105.019	10367.478	7276.276	12666.049	164399.71	0.08	ok
4989	-960.841	169.641	231.722	44682.432	32613.972	55318.992	158649.82	0.35	ok
4990	-986.804	174.133	235.467	26260.529	19127.517	32488.11	159311.98	0.20	ok
4991	-1012.768	178.101	238.385	13181.032	5283.914	14200.681	159974.14	0.09	ok
4992	-1038.731	181.468	240.459	13188.183	7783.371	15313.688	160636.30	0.10	ok
4993	-926.195	175.317	230.383	44867.527	34299.947	56476.379	157911.58	0.36	ok
4994	-952.159	179.845	234.05	26552.079	20362.282	33460.954	158573.74	0.21	ok
4995	-978.122	183.855	236.911	13659.745	6064.584	14945.495	159235.91	0.09	ok
4996	-1004.085	187.264	238.946	13140.965	7809.805	15286.531	159898.07	0.10	ok
4997	-949.235	170.582	223.066	43479.263	32897.699	54522.517	158325.08	0.34	ok
4998	-975.198	175.06	226.621	27007.756	19336.399	33216.189	158987.24	0.21	ok
4999	-1001.161	179.012	229.385	14308.601	5419.111	15300.419	159649.40	0.10	ok
5000	-1027.125	182.363	231.346	13192.539	7920.943	15387.801	160311.56	0.10	ok
5001	-927.65	158.81	220.559	43298.694	29386.32	52329.081	160403.78	0.33	ok
5002	-953.614	163.144	224.036	28099.831	16760.898	32718.927	161065.94	0.20	ok
5003	-979.577	166.932	226.741	16249.16	3790.92	16685.511	161728.10	0.10	ok
5004	-1005.54	170.117	228.657	13271.875	8346.177	15678.053	162390.26	0.10	ok
5005	-1191.819	257.249	311.486	65482.642	44941.256	79420.985	170728.24	0.47	ok
5006	-1227.655	261.013	314.743	41219.691	24489.926	47946.005	171390.40	0.28	ok
5007	-1263.508	264.094	317.083	22111.974	3744.476	22426.781	172052.56	0.13	ok
5008	-1299.377	266.462	318.54	18869.288	15895.027	24671.885	172714.73	0.14	ok
5009	-987.553	178.461	244.72	57895.876	36054.586	68204.587	159556.92	0.43	ok
5010	-1023.44	182.553	244.72	38440.669	21866.969	44224.986	160219.08	0.28	ok
5011	-1059.333	186.17	244.72	21317.63	7354.867	22550.73	160881.24	0.14	ok
5012	-1095.234	189.24	244.72	14176.304	8087.007	16320.762	161543.40	0.10	ok
5013	-1161.692	173.834	241.678	57193.759	34702.979	66898.601	164300.44	0.41	ok
5014	-1197.567	177.975	241.678	37980.373	20883.185	43343.006	164962.60	0.26	ok
5015	-1233.45	181.646	243.048	20813.497	6734.16	21875.799	165624.76	0.13	ok
5016	-1269.34	184.771	245.063	14691.399	7501.761	16495.867	166286.92	0.10	ok
5017	-1238.495	168.364	247.466	58572.812	33066.024	67261.7	167288.54	0.40	ok
5018	-1274.36	172.464	251.243	38930.601	19681.099	43622.67	167950.70	0.26	ok
5019	-1310.234	176.088	254.193	21402.141	5970.178	22219.241	168612.86	0.13	ok
5020	-1346.115	179.165	256.295	15296.905	7545.866	17056.828	169275.02	0.10	ok
5021	-995.523	175.286	90.038	8446.62	34074.853	35106.139	160337.69	0.22	ok
5022	-1021.486	179.757	93.703	1288.588	20139.606	20180.788	160999.85	0.13	ok
5023	-1047.449	183.715	96.562	-6160.8	5848.921	8495.0182	161662.01	0.05	ok

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5024	-1073.413	187.08	98.594	10215.893	7329.009	12572.941	162324.17	0.08	ok
5025	-977.339	170.698	82.514	6998.985	32716.194	33456.466	159650.33	0.21	ok
5026	-1003.303	175.121	86.064	439.451	19145.668	19150.711	160312.49	0.12	ok
5027	-1029.266	179.025	88.823	-6399.58	5223.516	8260.7351	160974.65	0.05	ok
5028	-1055.229	182.336	90.778	10257.154	7429.457	12665.151	161636.81	0.08	ok
5029	-936.122	158.947	75.812	5718.588	29212.661	29767.126	161334.56	0.18	ok
5030	-971.874	163.231	79.285	-308.457	16576.406	16579.276	161996.72	0.10	ok
5031	-1007.216	166.976	81.983	-6582.38	3599.56	7502.3036	162658.90	0.05	ok
5032	-1033.179	170.126	83.893	10247.932	7826.6	12894.797	163321.06	0.08	ok
5033	-1112.144	152.509	92.09	9759.043	27306.107	28997.627	167946.00	0.17	ok
5034	-1147.912	156.62	95.624	2437.856	15183.62	15378.084	168608.16	0.09	ok
5035	-1183.691	160.212	98.382	-5104.486	2734.882	5790.972	169270.32	0.03	ok
5036	-1219.483	163.233	100.344	10616.215	7593.489	13052.398	169932.48	0.08	ok
5037	-1077.534	172.275	95.041	10144.651	33157.78	34674.952	162490.61	0.21	ok
5038	-1113.401	176.523	98.653	2588.899	19461.913	19633.351	163152.77	0.12	ok
5039	-1149.276	180.271	101.475	-5253.999	5428.364	7554.5775	163814.93	0.05	ok
5040	-1185.159	183.45	103.484	11086.022	7584.75	13432.361	164477.09	0.08	ok
5041	-1074.035	178.687	97.821	10391.132	35059.552	36567.032	161646.51	0.23	ok
5042	-1109.904	182.983	101.474	2614.35	20853.923	21017.158	162308.69	0.13	ok
5043	-1145.782	186.786	104.318	-5452.819	6306.814	8337.214	162970.85	0.05	ok
5044	-1181.667	190.021	106.336	11755.71	7550.264	13971.514	163633.01	0.09	ok
5045	-1097.579	176.909	107.383	12354.438	34521.305	36665.415	162264.12	0.23	ok
5046	-1133.441	181.169	111.156	3817.522	20457.06	20810.209	162926.28	0.13	ok
5047	-1169.31	184.931	114.103	-5016.711	6054.162	7862.5865	163588.44	0.05	ok
5048	-1205.188	188.125	116.202	12351.983	7728.028	14570.309	164250.60	0.09	ok
5049	-1000.251	163.969	115.319	13791.07	30664.121	33622.64	164004.40	0.21	ok
5050	-1036.008	168.085	119.174	4623.584	17628.585	18224.833	164666.56	0.11	ok
5051	-1071.777	171.684	122.18	-4832.614	4265.798	6446.0213	165328.72	0.04	ok
5052	-1107.559	174.711	124.315	13222.818	8142.748	15528.917	165990.88	0.09	ok

Column Section Designer Check

Conejo Crossover: B42 Live Load Senario

Summary

Row Labels	Max of PMMRatio
B42 Strength 5	0.406514
B42 Strength 1-2 Max	0.254725
B42 Strength 1-1 Max	0.488748

TABLE: Concrete Design 1 - Column Summary Data - ACI 318-05/IBC2003											
Text	Text	Text	Text	Text	in	Text	Unitless	Text	Text	in2/in
Frame	**DesignSect**	**DesignType**	**DesignOpt**	**Status**	**Location**	**PMMCombo**	**PMMRatio**	**VMajCombo**	**VMinCombo**	**VMinRebar**
1260	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.374	B42 Strength 5	B42 Strength 5	0.0636
1260	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.251	B42 Strength 5	B42 Strength 5	0.0636
1261	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.251	B42 Strength 5	B42 Strength 5	0.0636
1261	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.144	B42 Strength 5	B42 Strength 5	0.0636
1262	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.144	B42 Strength 5	B42 Strength 5	0.0636
1262	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.158	B42 Strength 5	B42 Strength 5	0.0636
1263	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.158	B42 Strength 5	B42 Strength 5	0.0636
1263	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.301	B42 Strength 5	B42 Strength 5	0.0636
1264	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.369	B42 Strength 5	B42 Strength 5	0.0636
1264	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.248	B42 Strength 5	B42 Strength 5	0.0636
1265	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.248	B42 Strength 5	B42 Strength 5	0.0636
1265	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.147	B42 Strength 5	B42 Strength 5	0.0636
1266	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.147	B42 Strength 5	B42 Strength 5	0.0636
1266	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.155	B42 Strength 5	B42 Strength 5	0.0636
1267	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.155	B42 Strength 5	B42 Strength 5	0.0636
1267	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.296	B42 Strength 5	B42 Strength 5	0.0636
1268	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.361	B42 Strength 5	B42 Strength 5	0.0636
1268	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.245	B42 Strength 5	B42 Strength 5	0.0636
1269	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.245	B42 Strength 5	B42 Strength 5	0.0636
1269	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.140	B42 Strength 5	B42 Strength 5	0.0636
1270	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.140	B42 Strength 5	B42 Strength 5	0.0636
1270	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.161	B42 Strength 5	B42 Strength 5	0.0636
1271	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.161	B42 Strength 5	B42 Strength 5	0.0636
1271	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.296	B42 Strength 5	B42 Strength 5	0.0636
1272	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.342	B42 Strength 5	B42 Strength 5	0.0636
1272	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.232	B42 Strength 5	B42 Strength 5	0.0636
1273	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.232	B42 Strength 5	B42 Strength 5	0.0636
1273	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.130	B42 Strength 5	B42 Strength 5	0.0636
1274	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.130	B42 Strength 5	B42 Strength 5	0.0636
1274	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.153	B42 Strength 5	B42 Strength 5	0.0636
1275	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.153	B42 Strength 5	B42 Strength 5	0.0636
1275	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.284	B42 Strength 5	B42 Strength 5	0.0636
1276	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.350	B42 Strength 5	B42 Strength 5	0.0636
1276	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.236	B42 Strength 5	B42 Strength 5	0.0636
1277	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.236	B42 Strength 5	B42 Strength 5	0.0636
1277	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.140	B42 Strength 5	B42 Strength 5	0.0636
1278	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.140	B42 Strength 5	B42 Strength 5	0.0636
1278	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 5	0.0636
1279	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 5	0.0636
1279	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.279	B42 Strength 5	B42 Strength 5	0.0636
1280	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.354	B42 Strength 5	B42 Strength 5	0.0636
1280	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.240	B42 Strength 5	B42 Strength 5	0.0636
1281	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.240	B42 Strength 5	B42 Strength 5	0.0636
1281	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.142	B42 Strength 5	B42 Strength 5	0.0636
1282	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.142	B42 Strength 5	B42 Strength 5	0.0636
1282	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 5	0.0636
1283	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 5	0.0636
1283	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.280	B42 Strength 5	B42 Strength 5	0.0636
1284	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.333	B42 Strength 5	B42 Strength 5	0.0636
1284	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.225	B42 Strength 5	B42 Strength 5	0.0636
1285	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.225	B42 Strength 5	B42 Strength 5	0.0636
1285	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.123	B42 Strength 5	B42 Strength 5	0.0636
1286	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.123	B42 Strength 5	B42 Strength 5	0.0636
1286	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
1287	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
1287	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.278	B42 Strength 5	B42 Strength 5	0.0636
1288	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.370	B42 Strength 5	B42 Strength 5	0.0636
1288	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.269	B42 Strength 5	B42 Strength 5	0.0636
1289	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.269	B42 Strength 5	B42 Strength 5	0.0636
1289	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.208	B42 Strength 5	B42 Strength 5	0.0636

1290	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.208	B42 Strength 5	B42 Strength 5	0.0636
1290	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.188	B42 Strength 5	B42 Strength 5	0.0636
1291	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.188	B42 Strength 5	B42 Strength 5	0.0636
1291	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.290	B42 Strength 5	B42 Strength 5	0.0636
1292	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.377	B42 Strength 5	B42 Strength 5	0.0636
1292	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.277	B42 Strength 5	B42 Strength 5	0.0636
1293	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.277	B42 Strength 5	B42 Strength 5	0.0636
1293	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.208	B42 Strength 5	B42 Strength 5	0.0636
1294	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.208	B42 Strength 5	B42 Strength 5	0.0636
1294	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.186	B42 Strength 5	B42 Strength 5	0.0636
1295	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.186	B42 Strength 5	B42 Strength 5	0.0636
1295	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.291	B42 Strength 5	B42 Strength 5	0.0636
1296	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.400	B42 Strength 5	B42 Strength 5	0.0636
1296	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.293	B42 Strength 5	B42 Strength 5	0.0636
1297	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.293	B42 Strength 5	B42 Strength 5	0.0636
1297	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.213	B42 Strength 5	B42 Strength 5	0.0636
1298	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.213	B42 Strength 5	B42 Strength 5	0.0636
1298	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.196	B42 Strength 5	B42 Strength 5	0.0636
1299	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.196	B42 Strength 5	B42 Strength 5	0.0636
1299	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.297	B42 Strength 5	B42 Strength 5	0.0636
1300	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.419	B42 Strength 5	B42 Strength 5	0.0636
1300	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.302	B42 Strength 5	B42 Strength 5	0.0636
1301	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.302	B42 Strength 5	B42 Strength 5	0.0636
1301	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.223	B42 Strength 5	B42 Strength 5	0.0636
1302	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.223	B42 Strength 5	B42 Strength 5	0.0636
1302	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.199	B42 Strength 5	B42 Strength 5	0.0636
1303	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.199	B42 Strength 5	B42 Strength 5	0.0636
1303	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.295	B42 Strength 5	B42 Strength 5	0.0636
1304	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.409	B42 Strength 5	B42 Strength 5	0
1304	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.300	B42 Strength 5	B42 Strength 5	0
1305	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.300	B42 Strength 5	B42 Strength 5	0
1305	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.229	B42 Strength 5	B42 Strength 5	0
1306	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.229	B42 Strength 5	B42 Strength 5	0
1306	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.199	B42 Strength 5	B42 Strength 5	0
1307	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.199	B42 Strength 5	B42 Strength 5	0
1307	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.281	B42 Strength 5	B42 Strength 5	0
1308	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.407	B42 Strength 5	B42 Strength 5	0
1308	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.301	B42 Strength 5	B42 Strength 5	0
1309	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.301	B42 Strength 5	B42 Strength 5	0
1309	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.235	B42 Strength 5	B42 Strength 5	0
1310	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.235	B42 Strength 5	B42 Strength 5	0
1310	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.207	B42 Strength 5	B42 Strength 5	0
1311	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.207	B42 Strength 5	B42 Strength 5	0
1311	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.280	B42 Strength 5	B42 Strength 5	0
1312	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.414	B42 Strength 5	B42 Strength 5	0
1312	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.309	B42 Strength 5	B42 Strength 5	0
1313	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.309	B42 Strength 5	B42 Strength 5	0
1313	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.241	B42 Strength 5	B42 Strength 5	0
1314	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.241	B42 Strength 5	B42 Strength 5	0
1314	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.214	B42 Strength 5	B42 Strength 5	0
1315	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.214	B42 Strength 5	B42 Strength 5	0
1315	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.286	B42 Strength 5	B42 Strength 5	0
1316	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.410	B42 Strength 5	B42 Strength 5	0
1316	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.306	B42 Strength 5	B42 Strength 5	0
1317	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.306	B42 Strength 5	B42 Strength 5	0
1317	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.236	B42 Strength 5	B42 Strength 5	0
1318	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.236	B42 Strength 5	B42 Strength 5	0
1318	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.210	B42 Strength 5	B42 Strength 5	0
1319	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.210	B42 Strength 5	B42 Strength 5	0
1319	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.293	B42 Strength 5	B42 Strength 5	0
1320	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.356	B42 Strength 5	B42 Strength 5	0.0636
1320	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.250	B42 Strength 5	B42 Strength 5	0.0636
1321	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.250	B42 Strength 5	B42 Strength 5	0.0636
1321	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.158	B42 Strength 5	B42 Strength 5	0.0636
1322	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.158	B42 Strength 5	B42 Strength 5	0.0636
1322	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
1323	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
1323	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.278	B42 Strength 5	B42 Strength 5	0.0636
1324	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.353	B42 Strength 5	B42 Strength 1-1	0.0636
1324	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.252	B42 Strength 5	B42 Strength 1-1	0.0636
1325	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.252	B42 Strength 5	B42 Strength 1-1	0.0636
1325	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.164	B42 Strength 5	B42 Strength 1-1	0.0636
1326	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.164	B42 Strength 5	B42 Strength 1-1	0.0636
1326	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 1-1	0.0636

1327	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 1-1	0.0636
1327	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.270	B42 Strength 5	B42 Strength 1-1	0.0636
1328	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.349	B42 Strength 5	B42 Strength 1-1	0.0636
1328	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.248	B42 Strength 5	B42 Strength 1-1	0.0636
1329	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.248	B42 Strength 5	B42 Strength 1-1	0.0636
1329	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.162	B42 Strength 5	B42 Strength 1-1	0.0636
1330	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.162	B42 Strength 5	B42 Strength 1-1	0.0636
1330	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.145	B42 Strength 5	B42 Strength 1-1	0.0636
1331	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.145	B42 Strength 5	B42 Strength 1-1	0.0636
1331	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.264	B42 Strength 5	B42 Strength 1-1	0.0636
1332	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.364	B42 Strength 5	B42 Strength 5	0.0636
1332	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.256	B42 Strength 5	B42 Strength 5	0.0636
1333	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.256	B42 Strength 5	B42 Strength 5	0.0636
1333	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.154	B42 Strength 5	B42 Strength 5	0.0636
1334	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.154	B42 Strength 5	B42 Strength 5	0.0636
1334	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.156	B42 Strength 5	B42 Strength 5	0.0636
1335	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.156	B42 Strength 5	B42 Strength 5	0.0636
1335	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.282	B42 Strength 5	B42 Strength 5	0.0636
1336	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.346	B42 Strength 5	B42 Strength 5	0.0636
1336	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.233	B42 Strength 5	B42 Strength 5	0.0636
1337	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.233	B42 Strength 5	B42 Strength 5	0.0636
1337	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.151	B42 Strength 5	B42 Strength 5	0.0636
1338	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.151	B42 Strength 5	B42 Strength 5	0.0636
1338	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.159	B42 Strength 5	B42 Strength 5	0.0636
1339	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.159	B42 Strength 5	B42 Strength 5	0.0636
1339	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.288	B42 Strength 5	B42 Strength 5	0.0636
1340	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.344	B42 Strength 5	B42 Strength 5	0.0636
1340	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.231	B42 Strength 5	B42 Strength 5	0.0636
1341	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.231	B42 Strength 5	B42 Strength 5	0.0636
1341	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.153	B42 Strength 5	B42 Strength 5	0.0636
1342	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.153	B42 Strength 5	B42 Strength 5	0.0636
1342	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
1343	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
1343	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.280	B42 Strength 5	B42 Strength 5	0.0636
1344	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.350	B42 Strength 5	B42 Strength 5	0.0636
1344	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.234	B42 Strength 5	B42 Strength 5	0.0636
1345	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.234	B42 Strength 5	B42 Strength 5	0.0636
1345	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.154	B42 Strength 5	B42 Strength 5	0.0636
1346	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.154	B42 Strength 5	B42 Strength 5	0.0636
1346	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.150	B42 Strength 5	B42 Strength 5	0.0636
1347	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.150	B42 Strength 5	B42 Strength 5	0.0636
1347	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.281	B42 Strength 5	B42 Strength 5	0.0636
1348	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.395	B42 Strength 5	B42 Strength 5	0.0636
1348	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.272	B42 Strength 5	B42 Strength 5	0.0636
1349	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.272	B42 Strength 5	B42 Strength 5	0.0636
1349	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.189	B42 Strength 5	B42 Strength 5	0.0636
1350	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.189	B42 Strength 5	B42 Strength 5	0.0636
1350	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.186	B42 Strength 5	B42 Strength 5	0.0636
1351	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.186	B42 Strength 5	B42 Strength 5	0.0636
1351	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.304	B42 Strength 5	B42 Strength 5	0.0636
1352	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.389	B42 Strength 5	B42 Strength 5	0.0636
1352	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.270	B42 Strength 5	B42 Strength 5	0.0636
1353	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.270	B42 Strength 5	B42 Strength 5	0.0636
1353	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.192	B42 Strength 5	B42 Strength 5	0.0636
1355	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.192	B42 Strength 5	B42 Strength 5	0.0636
1355	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.183	B42 Strength 5	B42 Strength 5	0.0636
1356	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.183	B42 Strength 5	B42 Strength 5	0.0636
1356	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.299	B42 Strength 5	B42 Strength 5	0.0636
1357	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.384	B42 Strength 5	B42 Strength 5	0.0636
1357	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.266	B42 Strength 5	B42 Strength 5	0.0636
1358	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.266	B42 Strength 5	B42 Strength 5	0.0636
1358	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.190	B42 Strength 5	B42 Strength 5	0.0636
1359	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.190	B42 Strength 5	B42 Strength 5	0.0636
1359	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.180	B42 Strength 5	B42 Strength 5	0.0636
1360	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.180	B42 Strength 5	B42 Strength 5	0.0636
1360	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.296	B42 Strength 5	B42 Strength 5	0.0636
1361	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.392	B42 Strength 5	B42 Strength 5	0.0636
1361	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.268	B42 Strength 5	B42 Strength 5	0.0636
1362	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.268	B42 Strength 5	B42 Strength 5	0.0636
1362	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.187	B42 Strength 5	B42 Strength 5	0.0636
1363	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.187	B42 Strength 5	B42 Strength 5	0.0636
1363	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.188	B42 Strength 5	B42 Strength 5	0.0636
1364	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.188	B42 Strength 5	B42 Strength 5	0.0636
1364	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.300	B42 Strength 5	B42 Strength 5	0.0636

1365	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.363	B42 Strength 5	B42 Strength 5	0.0636
1365	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.248	B42 Strength 5	B42 Strength 5	0.0636
1366	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.248	B42 Strength 5	B42 Strength 5	0.0636
1366	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.169	B42 Strength 5	B42 Strength 5	0.0636
1367	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.169	B42 Strength 5	B42 Strength 5	0.0636
1367	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.175	B42 Strength 5	B42 Strength 5	0.0636
1368	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.175	B42 Strength 5	B42 Strength 5	0.0636
1368	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.284	B42 Strength 5	B42 Strength 5	0.0636
1369	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.365	B42 Strength 5	B42 Strength 5	0.0636
1369	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.251	B42 Strength 5	B42 Strength 5	0.0636
1370	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.251	B42 Strength 5	B42 Strength 5	0.0636
1370	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.175	B42 Strength 5	B42 Strength 5	0.0636
1371	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.175	B42 Strength 5	B42 Strength 5	0.0636
1371	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.170	B42 Strength 5	B42 Strength 5	0.0636
1372	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.170	B42 Strength 5	B42 Strength 5	0.0636
1372	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.282	B42 Strength 5	B42 Strength 5	0.0636
1373	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.368	B42 Strength 5	B42 Strength 5	0.0636
1373	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.256	B42 Strength 5	B42 Strength 5	0.0636
1374	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.256	B42 Strength 5	B42 Strength 5	0.0636
1374	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.175	B42 Strength 5	B42 Strength 5	0.0636
1375	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.175	B42 Strength 5	B42 Strength 5	0.0636
1375	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.169	B42 Strength 5	B42 Strength 5	0.0636
1376	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.169	B42 Strength 5	B42 Strength 5	0.0636
1376	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.283	B42 Strength 5	B42 Strength 5	0.0636
1377	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.361	B42 Strength 5	B42 Strength 5	0
1377	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.250	B42 Strength 5	B42 Strength 5	0
1378	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.250	B42 Strength 5	B42 Strength 5	0.0636
1378	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.169	B42 Strength 5	B42 Strength 5	0.0636
1379	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.169	B42 Strength 5	B42 Strength 5	0.0636
1379	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.168	B42 Strength 5	B42 Strength 5	0.0636
1380	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.168	B42 Strength 5	B42 Strength 5	0.0636
1380	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.280	B42 Strength 5	B42 Strength 5	0.0636
1381	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.356	B42 Strength 5	B42 Strength 5	0.0636
1381	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.244	B42 Strength 5	B42 Strength 5	0.0636
1382	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.244	B42 Strength 5	B42 Strength 5	0.0636
1382	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.155	B42 Strength 5	B42 Strength 5	0.0636
1383	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.155	B42 Strength 5	B42 Strength 5	0.0636
1383	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.170	B42 Strength 5	B42 Strength 5	0.0636
1384	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.170	B42 Strength 5	B42 Strength 5	0.0636
1384	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.281	B42 Strength 5	B42 Strength 5	0.0636
1385	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.375	B42 Strength 5	B42 Strength 5	0.0636
1385	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.256	B42 Strength 5	B42 Strength 5	0.0636
1386	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.256	B42 Strength 5	B42 Strength 5	0.0636
1386	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.177	B42 Strength 5	B42 Strength 5	0.0636
1387	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.177	B42 Strength 5	B42 Strength 5	0.0636
1387	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.185	B42 Strength 5	B42 Strength 5	0.0636
1388	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.185	B42 Strength 5	B42 Strength 5	0.0636
1388	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.289	B42 Strength 5	B42 Strength 5	0.0636
1389	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.356	B42 Strength 5	B42 Strength 1-1	0.0636
1389	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.252	B42 Strength 5	B42 Strength 1-1	0.0636
1390	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.252	B42 Strength 5	B42 Strength 1-1	0.0636
1390	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.159	B42 Strength 5	B42 Strength 1-1	0.0636
1391	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.159	B42 Strength 5	B42 Strength 1-1	0.0636
1391	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.145	B42 Strength 5	B42 Strength 1-1	0.0636
1392	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.145	B42 Strength 5	B42 Strength 1-1	0.0636
1392	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.269	B42 Strength 5	B42 Strength 1-1	0.0636
1393	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.366	B42 Strength 5	B42 Strength 5	0.0636
1393	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.246	B42 Strength 5	B42 Strength 5	0.0636
1395	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.246	B42 Strength 5	B42 Strength 5	0.0636
1395	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.145	B42 Strength 5	B42 Strength 5	0.0636
1396	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.145	B42 Strength 5	B42 Strength 5	0.0636
1396	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.152	B42 Strength 5	B42 Strength 5	0.0636
1397	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.152	B42 Strength 5	B42 Strength 5	0.0636
1397	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.292	B42 Strength 5	B42 Strength 5	0.0636
1398	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.344	B42 Strength 5	B42 Strength 5	0.0636
1398	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.232	B42 Strength 5	B42 Strength 5	0.0636
1399	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.232	B42 Strength 5	B42 Strength 5	0.0636
1399	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.137	B42 Strength 5	B42 Strength 5	0.0636
1400	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.137	B42 Strength 5	B42 Strength 5	0.0636
1400	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 5	0.0636
1401	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 5	0.0636
1401	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.277	B42 Strength 5	B42 Strength 5	0.0636
1402	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.382	B42 Strength 5	B42 Strength 5	0.0636
1402	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.262	B42 Strength 5	B42 Strength 5	0.0636

1403	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.262	B42 Strength 5	B42 Strength 5	0.0636
1403	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.160	B42 Strength 5	B42 Strength 5	0.0636
1404	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.160	B42 Strength 5	B42 Strength 5	0.0636
1404	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.182	B42 Strength 5	B42 Strength 5	0.0636
1405	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.182	B42 Strength 5	B42 Strength 5	0.0636
1405	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.302	B42 Strength 5	B42 Strength 5	0.0636
1406	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.366	B42 Strength 5	B42 Strength 5	0.0636
1406	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.245	B42 Strength 5	B42 Strength 5	0.0636
1407	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.245	B42 Strength 5	B42 Strength 5	0.0636
1407	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.124	B42 Strength 5	B42 Strength 5	0.0636
1408	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.124	B42 Strength 5	B42 Strength 5	0.0636
1408	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.174	B42 Strength 5	B42 Strength 5	0.0636
1409	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.174	B42 Strength 5	B42 Strength 5	0.0636
1409	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.289	B42 Strength 5	B42 Strength 5	0.0636
1410	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.365	B42 Strength 5	B42 Strength 5	0.0636
1410	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.243	B42 Strength 5	B42 Strength 5	0.0636
1411	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.243	B42 Strength 5	B42 Strength 5	0.0636
1411	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.127	B42 Strength 5	B42 Strength 5	0.0636
1412	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.127	B42 Strength 5	B42 Strength 5	0.0636
1412	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.157	B42 Strength 5	B42 Strength 5	0.0636
1413	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.157	B42 Strength 5	B42 Strength 5	0.0636
1413	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.298	B42 Strength 5	B42 Strength 5	0.0636
1414	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.350	B42 Strength 5	B42 Strength 5	0.0636
1414	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.227	B42 Strength 5	B42 Strength 5	0.0636
1415	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.227	B42 Strength 5	B42 Strength 5	0.0636
1415	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.108	B42 Strength 5	B42 Strength 5	0.0636
1416	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.108	B42 Strength 5	B42 Strength 5	0.0636
1416	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.156	B42 Strength 5	B42 Strength 5	0.0636
1417	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.156	B42 Strength 5	B42 Strength 5	0.0636
1417	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.289	B42 Strength 5	B42 Strength 5	0.0636
1418	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.351	B42 Strength 5	B42 Strength 5	0.0636
1418	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.236	B42 Strength 5	B42 Strength 5	0.0636
1419	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.236	B42 Strength 5	B42 Strength 5	0.0636
1419	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.128	B42 Strength 5	B42 Strength 5	0.0636
1420	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.128	B42 Strength 5	B42 Strength 5	0.0636
1420	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.152	B42 Strength 5	B42 Strength 5	0.0636
1421	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.152	B42 Strength 5	B42 Strength 5	0.0636
1421	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.277	B42 Strength 5	B42 Strength 5	0.0636
1422	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.384	B42 Strength 5	B42 Strength 5	0.0636
1422	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.291	B42 Strength 5	B42 Strength 5	0.0636
1423	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.291	B42 Strength 5	B42 Strength 5	0.0636
1423	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.196	B42 Strength 5	B42 Strength 5	0.0636
1434	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.196	B42 Strength 5	B42 Strength 5	0.0636
1434	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.181	B42 Strength 5	B42 Strength 5	0.0636
1435	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.181	B42 Strength 5	B42 Strength 5	0.0636
1435	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.297	B42 Strength 5	B42 Strength 5	0.0636
1436	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.349	B42 Strength 5	B42 Strength 5	0.0636
1436	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.241	B42 Strength 5	B42 Strength 5	0.0636
1437	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.241	B42 Strength 5	B42 Strength 5	0.0636
1437	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.157	B42 Strength 5	B42 Strength 5	0.0636
1438	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.157	B42 Strength 5	B42 Strength 5	0.0636
1438	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
1439	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
1439	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.282	B42 Strength 5	B42 Strength 5	0.0636
1440	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.371	B42 Strength 5	B42 Strength 5	0.0636
1440	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.270	B42 Strength 5	B42 Strength 5	0.0636
1441	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.270	B42 Strength 5	B42 Strength 5	0.0636
1441	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.205	B42 Strength 5	B42 Strength 5	0.0636
1442	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.205	B42 Strength 5	B42 Strength 5	0.0636
1442	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.182	B42 Strength 5	B42 Strength 5	0.0636
1443	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.182	B42 Strength 5	B42 Strength 5	0.0636
1443	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.289	B42 Strength 5	B42 Strength 5	0.0636
1444	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.369	B42 Strength 5	B42 Strength 5	0.0636
1444	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.264	B42 Strength 5	B42 Strength 5	0.0636
1445	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.264	B42 Strength 5	B42 Strength 5	0.0636
1445	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.161	B42 Strength 5	B42 Strength 5	0.0636
1456	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.161	B42 Strength 5	B42 Strength 5	0.0636
1456	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.159	B42 Strength 5	B42 Strength 5	0.0636
1457	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.159	B42 Strength 5	B42 Strength 5	0.0636
1457	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.289	B42 Strength 5	B42 Strength 5	0.0636
1458	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.391	B42 Strength 5	B42 Strength 5	0.0636
1458	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.284	B42 Strength 5	B42 Strength 5	0.0636
1459	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.284	B42 Strength 5	B42 Strength 5	0.0636
1459	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.204	B42 Strength 5	B42 Strength 5	0.0636

1460	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.204	B42 Strength 5	B42 Strength 5	0.0636
1460	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.180	B42 Strength 5	B42 Strength 5	0.0636
1461	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.180	B42 Strength 5	B42 Strength 5	0.0636
1461	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.293	B42 Strength 5	B42 Strength 5	0.0636
1462	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.365	B42 Strength 5	B42 Strength 5	0.0636
1462	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.249	B42 Strength 5	B42 Strength 5	0.0636
1463	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.249	B42 Strength 5	B42 Strength 5	0.0636
1463	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.150	B42 Strength 5	B42 Strength 5	0.0636
1515	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.150	B42 Strength 5	B42 Strength 5	0.0636
1515	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.169	B42 Strength 5	B42 Strength 5	0.0636
1538	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.169	B42 Strength 5	B42 Strength 5	0.0636
1538	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.292	B42 Strength 5	B42 Strength 5	0.0636
1561	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.411	B42 Strength 5	B42 Strength 5	0.0636
1561	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.302	B42 Strength 5	B42 Strength 5	0.0636
1584	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.302	B42 Strength 5	B42 Strength 5	0.0636
1584	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.209	B42 Strength 5	B42 Strength 5	0.0636
1608	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.209	B42 Strength 5	B42 Strength 5	0.0636
1608	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.182	B42 Strength 5	B42 Strength 5	0.0636
1631	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.182	B42 Strength 5	B42 Strength 5	0.0636
1631	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.293	B42 Strength 5	B42 Strength 5	0.0636
1654	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.362	B42 Strength 5	B42 Strength 5	0.0636
1654	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.249	B42 Strength 5	B42 Strength 5	0.0636
2171	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.249	B42 Strength 5	B42 Strength 5	0.0636
2171	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.167	B42 Strength 5	B42 Strength 5	0.0636
2221	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.167	B42 Strength 5	B42 Strength 5	0.0636
2221	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.165	B42 Strength 5	B42 Strength 5	0.0636
4988	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.165	B42 Strength 5	B42 Strength 5	0.0636
4988	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.281	B42 Strength 5	B42 Strength 5	0.0636
4989	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.354	B42 Strength 5	B42 Strength 5	0.0636
4989	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.242	B42 Strength 5	B42 Strength 5	0.0636
4990	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.242	B42 Strength 5	B42 Strength 5	0.0636
4990	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.149	B42 Strength 5	B42 Strength 5	0.0636
4991	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.149	B42 Strength 5	B42 Strength 5	0.0636
4991	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.153	B42 Strength 5	B42 Strength 5	0.0636
4992	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.153	B42 Strength 5	B42 Strength 5	0.0636
4992	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.281	B42 Strength 5	B42 Strength 5	0.0636
4993	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.361	B42 Strength 5	B42 Strength 5	0.0636
4993	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.246	B42 Strength 5	B42 Strength 5	0.0636
4994	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.246	B42 Strength 5	B42 Strength 5	0.0636
4994	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.150	B42 Strength 5	B42 Strength 5	0.0636
4995	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.150	B42 Strength 5	B42 Strength 5	0.0636
4995	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.150	B42 Strength 5	B42 Strength 5	0.0636
4996	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.150	B42 Strength 5	B42 Strength 5	0.0636
4996	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.277	B42 Strength 5	B42 Strength 5	0.0636
4997	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.349	B42 Strength 5	B42 Strength 5	0.0636
4997	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.238	B42 Strength 5	B42 Strength 5	0.0636
4998	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.238	B42 Strength 5	B42 Strength 5	0.0636
4998	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.152	B42 Strength 5	B42 Strength 5	0.0636
4999	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.152	B42 Strength 5	B42 Strength 5	0.0636
4999	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
5000	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.151	B42 Strength 5	B42 Strength 5	0.0636
5000	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.271	B42 Strength 5	B42 Strength 5	0.0636
5001	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.335	B42 Strength 5	B42 Strength 5	0.0636
5001	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.230	B42 Strength 5	B42 Strength 5	0.0636
5002	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.230	B42 Strength 5	B42 Strength 5	0.0636
5002	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.152	B42 Strength 5	B42 Strength 5	0.0636
5003	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.152	B42 Strength 5	B42 Strength 5	0.0636
5003	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.154	B42 Strength 5	B42 Strength 5	0.0636
5004	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.154	B42 Strength 5	B42 Strength 5	0.0636
5004	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.268	B42 Strength 5	B42 Strength 5	0.0636
5005	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.489	B42 Strength 5	B42 Strength 5	0.0636
5005	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.345	B42 Strength 5	B42 Strength 5	0.0636
5006	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.345	B42 Strength 5	B42 Strength 5	0.0636
5006	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.210	B42 Strength 5	B42 Strength 5	0.0636
5007	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.210	B42 Strength 5	B42 Strength 5	0.0636
5007	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.225	B42 Strength 5	B42 Strength 5	0.0636
5008	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.225	B42 Strength 5	B42 Strength 5	0.0636
5008	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.407	B42 Strength 5	B42 Strength 5	0.0636
5009	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.389	B42 Strength 5	B42 Strength 5	0.0636
5009	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.286	B42 Strength 5	B42 Strength 5	0.0636
5010	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.286	B42 Strength 5	B42 Strength 5	0.0636
5010	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.190	B42 Strength 5	B42 Strength 5	0.0636
5011	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.190	B42 Strength 5	B42 Strength 5	0.0636
5011	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 5	0.0636

5012	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.148	B42 Strength 5	B42 Strength 5	0.0636
5012	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.268	B42 Strength 5	B42 Strength 5	0.0636
5013	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.384	B42 Strength 5	B42 Strength 5	0.0636
5013	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.287	B42 Strength 5	B42 Strength 5	0.0636
5014	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.287	B42 Strength 5	B42 Strength 5	0.0636
5014	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.202	B42 Strength 5	B42 Strength 5	0.0636
5015	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.202	B42 Strength 5	B42 Strength 5	0.0636
5015	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.167	B42 Strength 5	B42 Strength 5	0.0636
5016	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.167	B42 Strength 5	B42 Strength 5	0.0636
5016	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.279	B42 Strength 5	B42 Strength 5	0.0636
5017	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.400	B42 Strength 5	B42 Strength 5	0.0636
5017	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.299	B42 Strength 5	B42 Strength 5	0.0636
5018	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.299	B42 Strength 5	B42 Strength 5	0.0636
5018	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.211	B42 Strength 5	B42 Strength 5	0.0636
5019	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.211	B42 Strength 5	B42 Strength 5	0.0636
5019	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.177	B42 Strength 5	B42 Strength 5	0.0636
5020	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.177	B42 Strength 5	B42 Strength 5	0.0636
5020	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.287	B42 Strength 5	B42 Strength 5	0.0636
5021	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.365	B42 Strength 5	B42 Strength 5	0.0636
5021	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.253	B42 Strength 5	B42 Strength 5	0.0636
5022	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.253	B42 Strength 5	B42 Strength 5	0.0636
5022	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.162	B42 Strength 5	B42 Strength 5	0.0636
5023	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.162	B42 Strength 5	B42 Strength 5	0.0636
5023	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.159	B42 Strength 5	B42 Strength 5	0.0636
5024	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.159	B42 Strength 5	B42 Strength 5	0.0636
5024	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.278	B42 Strength 5	B42 Strength 5	0.0636
5025	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.354	B42 Strength 5	B42 Strength 5	0.0636
5025	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.243	B42 Strength 5	B42 Strength 5	0.0636
5026	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.243	B42 Strength 5	B42 Strength 5	0.0636
5026	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.159	B42 Strength 5	B42 Strength 5	0.0636
5027	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.159	B42 Strength 5	B42 Strength 5	0.0636
5027	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.155	B42 Strength 5	B42 Strength 5	0.0636
5028	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.155	B42 Strength 5	B42 Strength 5	0.0636
5028	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.274	B42 Strength 5	B42 Strength 5	0.0636
5029	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.342	B42 Strength 5	B42 Strength 5	0.0636
5029	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.234	B42 Strength 5	B42 Strength 5	0.0636
5030	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.234	B42 Strength 5	B42 Strength 5	0.0636
5030	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.159	B42 Strength 5	B42 Strength 5	0.0636
5031	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.159	B42 Strength 5	B42 Strength 5	0.0636
5031	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.156	B42 Strength 5	B42 Strength 5	0.0636
5032	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.156	B42 Strength 5	B42 Strength 5	0.0636
5032	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.273	B42 Strength 5	B42 Strength 5	0.0636
5033	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.406	B42 Strength 5	B42 Strength 5	0.0636
5033	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.294	B42 Strength 5	B42 Strength 5	0.0636
5034	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.294	B42 Strength 5	B42 Strength 5	0.0636
5034	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.198	B42 Strength 5	B42 Strength 5	0.0636
5035	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.198	B42 Strength 5	B42 Strength 5	0.0636
5035	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.175	B42 Strength 5	B42 Strength 5	0.0636
5036	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.175	B42 Strength 5	B42 Strength 5	0.0636
5036	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.279	B42 Strength 5	B42 Strength 5	0.0636
5037	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.392	B42 Strength 5	B42 Strength 5	0.0636
5037	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.291	B42 Strength 5	B42 Strength 5	0.0636
5038	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.291	B42 Strength 5	B42 Strength 5	0.0636
5038	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.192	B42 Strength 5	B42 Strength 5	0.0636
5039	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.192	B42 Strength 5	B42 Strength 5	0.0636
5039	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.155	B42 Strength 5	B42 Strength 5	0.0636
5040	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.155	B42 Strength 5	B42 Strength 5	0.0636
5040	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.280	B42 Strength 5	B42 Strength 5	0.0636
5041	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.378	B42 Strength 5	B42 Strength 5	0.0636
5041	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.281	B42 Strength 5	B42 Strength 5	0.0636
5042	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.281	B42 Strength 5	B42 Strength 5	0.0636
5042	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.188	B42 Strength 5	B42 Strength 5	0.0636
5043	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.188	B42 Strength 5	B42 Strength 5	0.0636
5043	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.153	B42 Strength 5	B42 Strength 5	0.0636
5044	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.153	B42 Strength 5	B42 Strength 5	0.0636
5044	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.284	B42 Strength 5	B42 Strength 5	0.0636
5045	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.380	B42 Strength 5	B42 Strength 5	0.0636
5045	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.282	B42 Strength 5	B42 Strength 5	0.0636
5046	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.282	B42 Strength 5	B42 Strength 5	0.0636
5046	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.188	B42 Strength 5	B42 Strength 5	0.0636
5047	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.188	B42 Strength 5	B42 Strength 5	0.0636
5047	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.157	B42 Strength 5	B42 Strength 5	0.0636
5048	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.157	B42 Strength 5	B42 Strength 5	0.0636
5048	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.293	B42 Strength 5	B42 Strength 5	0.0636

5049	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.375	B42 Strength 5	B42 Strength 5	0.0636
5049	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-1	0.275	B42 Strength 5	B42 Strength 5	0.0636
5050	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-1	0.275	B42 Strength 5	B42 Strength 5	0.0636
5050	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 1-2	0.177	B42 Strength 5	B42 Strength 5	0.0636
5051	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 1-2	0.177	B42 Strength 5	B42 Strength 5	0.0636
5051	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.165	B42 Strength 5	B42 Strength 5	0.0636
5052	Conejo Column 6ft	Column	Check	No Messages	0	B42 Strength 5	0.165	B42 Strength 5	B42 Strength 5	0.0636
5052	Conejo Column 6ft	Column	Check	No Messages	79.5	B42 Strength 5	0.301	B42 Strength 5	B42 Strength 5	0.0636

Column Capacity Plot - Crossover

Conejo Crossover: B42 Live Load Senario

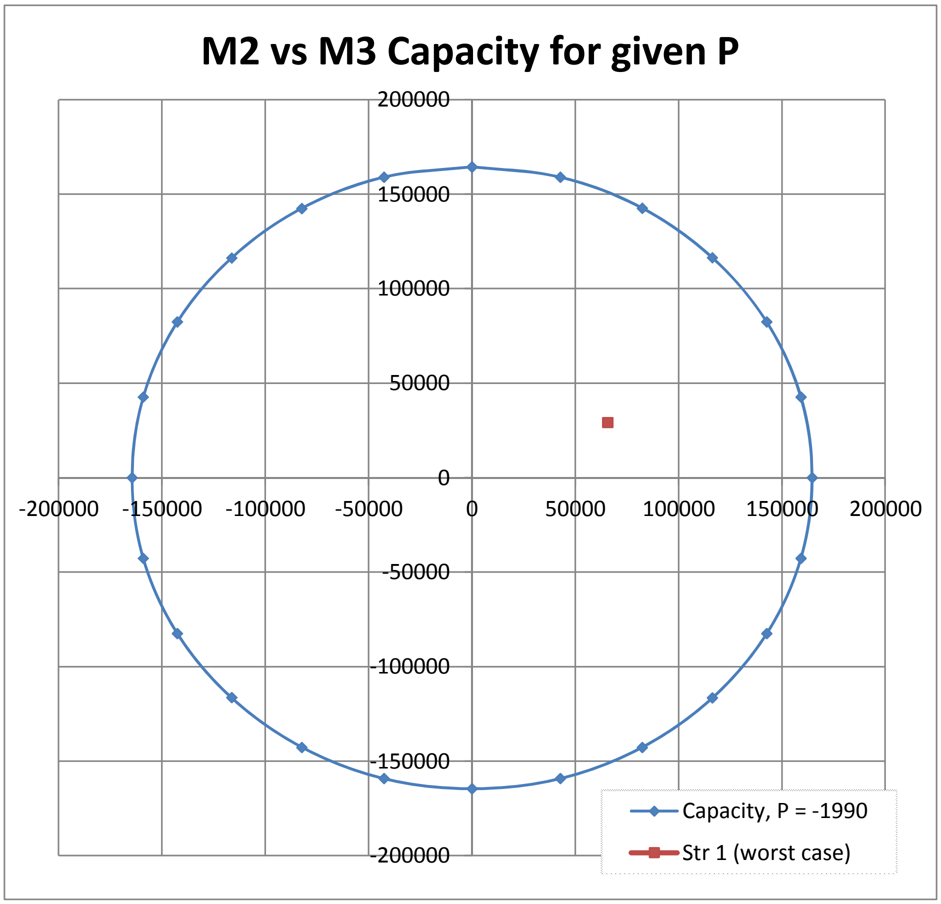
Strength 1

P	-1990	kips
M2	65674	kip-in
M3	29255	kip-in

Loads from most onerous load case and column section as identified by SAP section designer - see Column Strength Calculations (1)

6ft dia Column Capacity for P = -1990

	kip-in	kip-in
Angle	M2	M3
0	-50	164497
15	42671	159092
30	82356	142666
45	116305	116420
60	142652	82387
75	159112	42669
90	164526	0
105	159112	-42669
120	142652	-82387
135	116305	-116420
150	82356	-142666
165	42671	-159092
180	-50	-164497
195	-42590	-159124
210	-82424	-142608
225	-116316	-116344
240	-142626	-82467
255	-159125	-42629
270	-164495	0
285	-159125	42629
300	-142626	82467
315	-116316	116344
330	-82424	142608
345	-42590	159124
0	-50	164497



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

Column Capacity Plot - Viaduct

Conejo Crossover: B42 Live Load Senario

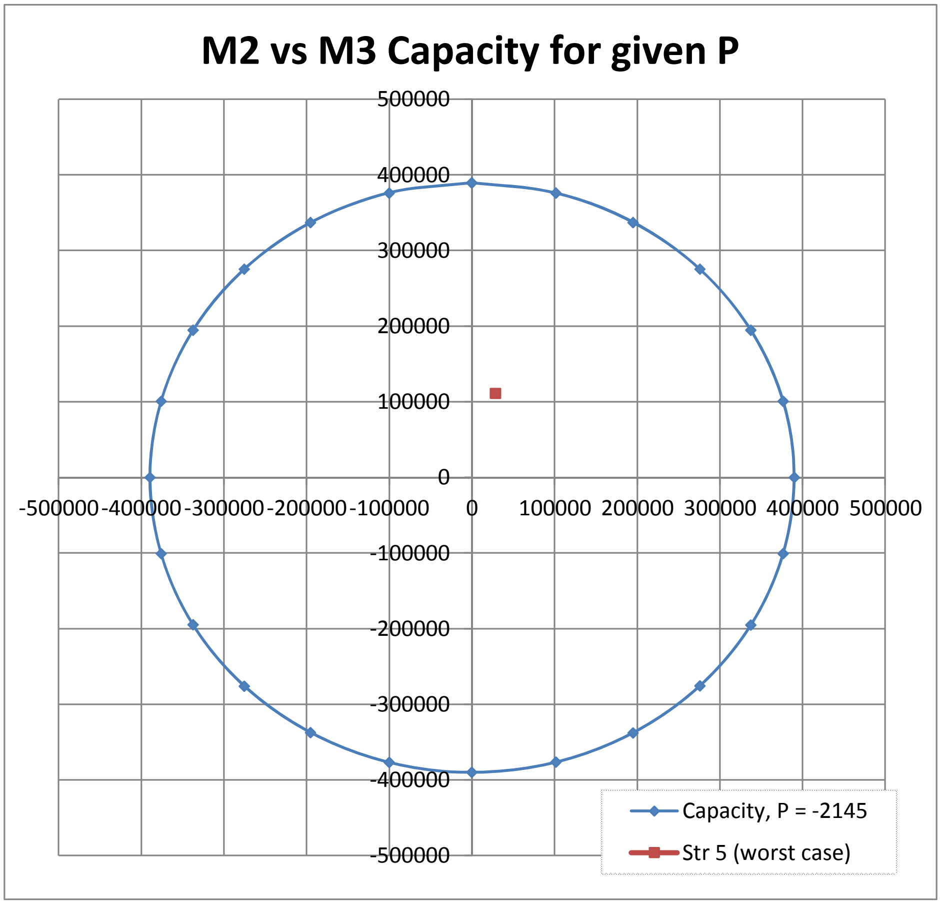
Strength 1

P	-2145	kips
M2	28319	kip-in
M3	111522	kip-in

Loads from most onerous load case and column section as identified by SAP section designer - see Column Strength Calculations (1)

10ft dia Column Capacity for P = -2145

	kip-in	kip-in
Angle	M2	M3
0	-450	389783
15	101246	376243
30	194568	337500
45	275688	275457
60	337268	194869
75	376331	100722
90	389612	0
105	376331	-100722
120	337268	-194869
135	275688	-275457
150	194568	-337500
165	101246	-376243
180	-450	-389783
195	-100376	-376431
210	-195249	-337164
225	-275405	-275685
240	-337412	-194751
255	-376254	-100680
270	-389726	0
285	-376254	100680
300	-337412	194751
315	-275405	275685
330	-195249	337164
345	-100376	376431
0	-450	389783



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

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Pile Capacity Output - Crossover

Conejo Crossover: B42 Live Load Senario

9ft diameter mono-pile shaft (1% reinforcement) using expected material properties

Pile 1 (M2)

P	-1067	kips
M2	194340	kip-in
M3	0	kip-in

Pile 1 (M3)

P	-1067
M2	0
M3	194340

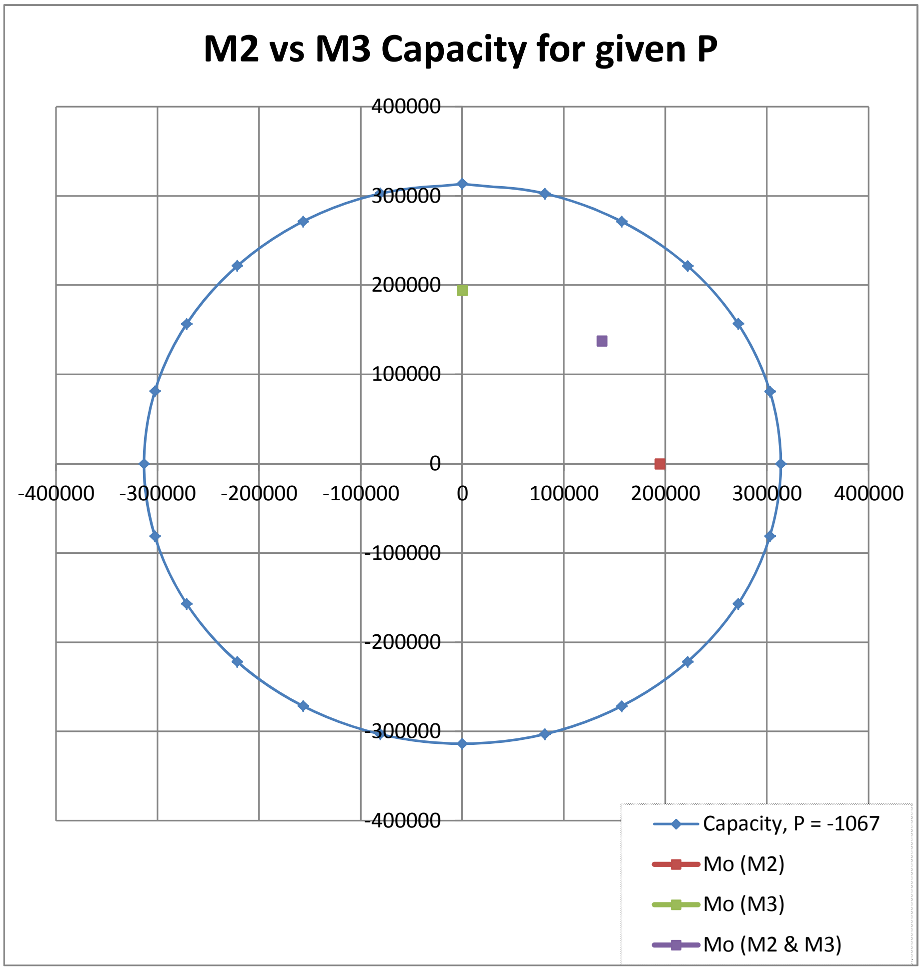
Pile 1 (M2 & M3)

P	-1067
M2	137419
M3	137419

Moments are derived from column overstrength moment M_o and associated overstrength shear V_o (CSDC 4.3.1)
Axial load, P is taken as the push/pull force on the tension pile subtracted by the column load used for M_o
Note: P is tension-positive

Column Capacity for P = -1067.017

Angle	M2 (kip-in)	M3 (kip-in)
0	-173	313553
15	81253	302738
30	156755	271505
45	221763	221643
60	271477	156804
75	302786	81086
90	313575	0
105	302786	-81086
120	271477	-156804
135	221763	-221643
150	156755	-271505
165	81253	-302738
180	-173	-313553
195	-80934	-302870
210	-156840	-271385
225	-221706	-221787
240	-271470	-156696
255	-302829	-81144
270	-313524	0
285	-302829	81144
300	-271470	156696
315	-221706	221787
330	-156840	271385
345	-80934	302870
0	-173	313553



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

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Pile Capacity Output - Viaduct

Conejo Crossover: B42 Live Load Senario

Worst case in column location next to crossover structure with only 2no. piles. Consider this case only

Pile 1 (M2)

P	268	kips
M2	0	kip-in
M3	112522	kip-in

Pile 1 (M3)

P	-989
M2	311211
M3	12414

Pile 1 (M2 & M3)

P	-100
M2	220049
M3	83197

Pile 2 (M2)

P	-2245	kips
M2	0	kip-in
M3	87695	kip-in

Pile 2 (M3)

P	-989
M2	311211
M3	-12414

Pile 2 (M2 & M3)

P	-1877
M2	220049
M3	58370

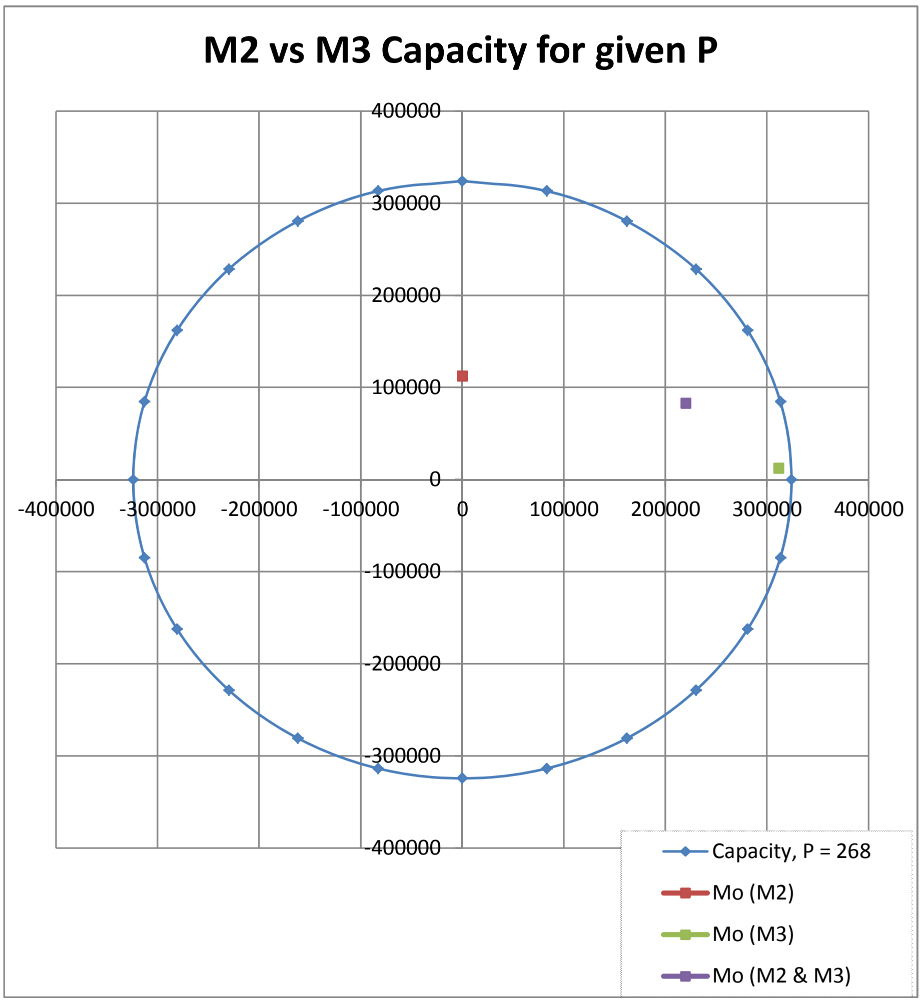
Moments are derived from column overstrength moment M_o and associated overstrength shear V_o (CSDC 4.3.1)

Axial load, P is taken as the push/pull force on the tension pile subtracted by the column load used for M_o

Note: P is tension-positive

Column Capacity for P = 267.661

	kip-in	kip-in
Angle	M2	M3
0	0	324260
15	83058	313547
30	162058	280663
45	229964	228691
60	280853	162166
75	313076	84815
90	324056	0
105	313076	-84815
120	280853	-162166
135	229964	-228691
150	162058	-280663
165	83058	-313547
180	0	-324260
195	-83058	-313547
210	-162058	-280663
225	-229964	-228691
240	-280853	-162166
255	-313076	-84815
270	-324056	0
285	-313076	84815
300	-280853	162166
315	-229964	228691
330	-162058	280663
345	-83058	313547
0	0	324260



Values output from CSiBridge section designer, calculated to AASHTO LRFD 2007

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Dowel Strength Calculations

Conejo Crossover: B42 Live Load Senario

Maximum

Row Labels	Max of P	Max of V2	Max of V3	Max of T	Max of M2	Max of M3
B42 Strength 1-1 Max	0	0	826.566	0	2732.334	0
B42 Strength 1-2 Max	0	0	1042.102	0	4872.86	0
B42 Strength 1-1 Min	0	0	888.911	0	3018.114	0
B42 Strength 1-2 Min	0	0	986.376	0	4631.235	0
B42 Strength 5	0	0	245.01	0	2000.662	0

Minimum

Row Labels	Min of P	Min of V2	Min of V3	Min of T	Min of M2	Min of M3
B42 Strength 1-1 Max	0	0	-814.365	0	-2590.584	0
B42 Strength 1-2 Max	0	0	-1092.601	0	-6314.987	0
B42 Strength 1-1 Min	0	0	-870.091	0	-2809.341	0
B42 Strength 1-2 Min	0	0	-1030.256	0	-5945.201	0
B42 Strength 5	0	0	-211.509	0	-2897.08	0

Input AASHTO LRFD 2007

Dowel diameter	12	in	
E	29000	kip/in2	
I	1017.88	in4	
Zp	288	in4	
Fy	50	kip/in2	
Resistance Factor	0.8		6.5.4.2

Flexure

Mn (elastic)	8482	kip-in	AASHTO LRFD C6.12.2.2.3
Mr	6786	kip-in	taking elastic modulus, not plastic (conservative)
M	6315	kip-in	
D/C	0.93	ok	

Shear

Vn	3280	kips	AASHTO LRFD C6.13.5.3
Vr	2624	kips	
V	1093	kips	
D/C	0.42	ok	

Local Bent Model Pushover Analysis Results

Conejo Crossover

INPUT

Description	Units	Reference			Typ Column
SAP Model					Global and Segment PO models
Comments					
Section Label		SAP2000 Section Design			Column 6ft
Ec	psi	(CSDC 3.2.6 per TM 2.10.4)			4502943
"L" of col	ft	(CSDC 3.1.3 per TM 2.10.4)			13.3
Lp	in	(CSDC 7.6.2 per TM 2.10.4)			29.99
M_p^{col} (Caltrans Idealized - initial)	k-in	SAP2000 Section Design			154720
f_y (Caltrans Idealized)	rad/in	SAP2000 Section Design			0.00004797
f_u	rad/in	SAP2000 Section Design			0.00029901
Ig	in4	SAP2000 Section Design			1302312
ε_{cc}		SAP2000 Section Design			0.0053
ε_{cu}		SAP2000 Section Design			0.0091
M_y^{col} (Caltrans Idealized)	k-in	SAP2000 Section Design			116353
Average P_{dl}	k	SAP2000			1000

OUTPUT

Description	Units	Reference			Typ Column	
$E_c*I_{eff} = M_y/f_y$	k-in2/rad	(CSDC 5.6 per TM 2.10.4)			2425536794	
I_{eff}	in4				538656	
I_{eff}/I_g					0.41	
Actual modifier used in model					0.4	Verified by CSDC

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MCE Displacement

Conejo Crossover

Model: MCE, Con1

Displacement measured at top of columns

Row Labels	Max of U1	Min of U1	Max of U2	Min of U2	|U1|	|U2|
5223	1.286807	-1.257429	1.034089	-0.982258	1.286807	1.034089
5225	1.152195	-1.169913	1.040962	-0.987529	1.169913	1.040962
5227	1.159338	-1.177133	1.000088	-0.966637	1.177133	1.000088
5229	1.287091	-1.258458	0.997075	-0.962452	1.287091	0.997075
5231	1.159582	-1.177369	0.988787	-0.973089	1.177369	0.988787
5233	1.279971	-1.252276	0.988187	-0.970634	1.279971	0.988187
5235	1.153137	-1.170824	1.016209	-1.014022	1.170824	1.016209
5237	1.26604	-1.239937	1.014123	-1.013567	1.26604	1.014123
5239	1.136543	-1.153966	1.079046	-1.076398	1.153966	1.079046
5241	1.241568	-1.217663	1.076648	-1.075883	1.241568	1.076648
5243	1.115087	-1.134711	1.108116	-1.10155	1.134711	1.108116
5245	1.176899	-1.157816	1.108155	-1.102217	1.176899	1.108155
5247	1.131706	-1.151761	1.098574	-1.08504	1.151761	1.098574
5249	1.191728	-1.173094	1.098217	-1.085562	1.191728	1.098217
5251	1.137295	-1.157505	1.095876	-1.078297	1.157505	1.095876
5253	1.195163	-1.17769	1.095964	-1.079588	1.195163	1.095964
5255	1.22991	-1.236249	1.129893	-1.110667	1.236249	1.129893
5257	1.279141	-1.286622	1.130186	-1.116769	1.286622	1.130186
5259	1.252069	-1.263448	1.130027	-1.115498	1.263448	1.130027
5261	1.299193	-1.306103	1.116562	-1.108446	1.306103	1.116562
5263	1.271094	-1.282636	1.117073	-1.107639	1.282636	1.117073
5265	1.307421	-1.313739	1.11332	-1.11463	1.313739	1.11463
5267	1.277924	-1.289523	1.113411	-1.114887	1.289523	1.114887
5269	1.302297	-1.30804	1.104858	-1.118807	1.30804	1.118807
5271	1.271233	-1.282772	1.105119	-1.119134	1.282772	1.119134
5273	1.284674	-1.28987	1.100999	-1.1253	1.28987	1.1253
5275	1.252038	-1.263404	1.101141	-1.125433	1.263404	1.125433
5277	1.363784	-1.353877	1.103697	-1.131138	1.363784	1.131138
5279	1.280261	-1.316663	1.105688	-1.132345	1.316663	1.132345
5281	1.384288	-1.373058	1.113132	-1.134417	1.384288	1.134417
5283	1.29875	-1.335699	1.114738	-1.135701	1.335699	1.135701
5285	1.393638	-1.381164	1.124099	-1.140317	1.393638	1.140317
5287	1.305918	-1.343058	1.126208	-1.142588	1.343058	1.142588
5289	1.395803	-1.382136	1.141464	-1.157177	1.395803	1.157177
5291	1.305668	-1.342756	1.144187	-1.161574	1.342756	1.161574
5293	1.390236	-1.375499	1.152072	-1.172179	1.390236	1.172179
5295	1.372246	-1.356599	1.161583	-1.185897	1.372246	1.185897
5297	1.297754	-1.334536	1.154731	-1.176435	1.334536	1.176435
5299	1.278383	-1.314515	1.165031	-1.19171	1.314515	1.19171
5483	1.13487	-1.152267	1.087763	-1.033718	1.152267	1.087763
5485	1.274531	-1.244502	1.081256	-1.028524	1.274531	1.081256
5539	1.131222	-1.151268	1.095961	-1.075604	1.151268	1.095961
5541	1.187687	-1.171711	1.096298	-1.076615	1.187687	1.096298
5543	1.114394	-1.134147	1.100269	-1.082207	1.134147	1.100269
5545	1.170497	-1.15488	1.100854	-1.083057	1.170497	1.100854

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5547	1.228078	-1.241183	1.128679	-1.10975	1.241183	1.128679
5549	1.139469	-1.144199	1.098079	-1.0803	1.144199	1.098079
5551	1.247297	-1.253728	1.087547	-1.062047	1.253728	1.087547
5553	1.246497	-1.259841	1.086569	-1.061454	1.259841	1.086569
5555	1.250675	-1.264093	1.053823	-1.024763	1.264093	1.053823
5557	1.243896	-1.257233	1.022211	-0.995403	1.257233	1.022211
5559	1.225861	-1.238977	1.004801	-0.97636	1.238977	1.004801
5561	1.129627	-1.134337	0.991293	-0.962483	1.134337	0.991293
5563	1.155323	-1.160158	1.020091	-0.993745	1.160158	1.020091
5565	1.161319	-1.166083	1.040364	-1.013272	1.166083	1.040364
5567	1.156495	-1.161233	1.07053	-1.047247	1.161233	1.07053
5569	1.250932	-1.257369	1.054272	-1.025206	1.257369	1.054272
5571	1.243894	-1.250306	1.022391	-0.995678	1.250306	1.022391
5573	1.225895	-1.232235	1.005213	-0.977011	1.232235	1.005213
5575	1.16362	-1.173794	1.013076	-0.983908	1.173794	1.013076
5577	1.18085	-1.19106	1.02831	-1.001585	1.19106	1.02831
5579	1.186952	-1.197155	1.04342	-1.016007	1.197155	1.04342
5581	1.182547	-1.192684	1.071289	-1.047773	1.192684	1.071289
5583	1.164635	-1.174655	1.097735	-1.080264	1.174655	1.097735
				MAX	**1.395803**	**1.19171**

Displacement Ductility Demand (X-Direction)

Conejo Crossover

The following table lists the nodes at the tops of columns that yield first under pushover analysis, at the step number shown. These nodal displacements are then compared with the displacements observed under MCE conditions.

StepNum	7			
	Δ_Y			
Row Labels	**Max of U1**	Δ_D	μ_D	
5561	1.697733	1.134337	0.668148	ok

CSDC 2.2.4 Target Displacement Ductility Demand:

$\mu_D \leq 5$

TABLE: Joint Displacements				From stiff model			
Text	Text	Text	Text	Unitless	in	in	in
Joint	**OutputCase**	**CaseType**	**StepType**	**StepNum**	**U1**	**U2**	**U3**
5561	PUSH X	NonStatic	Step	0	-0.00204	0.001589	-0.06562
5561	PUSH X	NonStatic	Step	1	0.233282	-0.00052	-0.05614
5561	PUSH X	NonStatic	Step	2	0.473384	-0.00196	-0.04922
5561	PUSH X	NonStatic	Step	3	0.711004	-0.00335	-0.04237
5561	PUSH X	NonStatic	Step	4	0.94967	-0.00481	-0.03549
5561	PUSH X	NonStatic	Step	5	1.191051	-0.00587	-0.02855
5561	PUSH X	NonStatic	Step	6	1.418811	-0.0046	-0.0221
5561	PUSH X	NonStatic	Step	7	1.697733	-0.00365	-0.00739
5561	PUSH X	NonStatic	Step	8	1.901843	-0.00246	0.004611
5561	PUSH X	NonStatic	Step	9	2.109966	-0.00065	0.019935
5561	PUSH X	NonStatic	Step	10	2.418904	0.000029	0.053101
5561	PUSH X	NonStatic	Step	11	2.73548	0.000803	0.087011
5561	PUSH X	NonStatic	Step	12	3.07676	0.001425	0.123835
5561	PUSH X	NonStatic	Step	13	3.331695	0.002345	0.151317
5561	PUSH X	NonStatic	Step	14	3.583148	0.003239	0.178423
5561	PUSH X	NonStatic	Step	15	4.032713	0.012348	0.226658
5561	PUSH X	NonStatic	Step	16	4.391195	0.025362	0.264675
5561	PUSH X	NonStatic	Step	17	4.738771	0.031061	0.30377
5561	PUSH X	NonStatic	Step	18	5.101203	0.036721	0.345794
5561	PUSH X	NonStatic	Step	19	5.447848	0.037114	0.386777
5561	PUSH X	NonStatic	Step	20	5.86276	0.045357	0.435357
5561	PUSH X	NonStatic	Step	21	6.406858	0.044319	0.499914
5561	PUSH X	NonStatic	Step	22	6.776212	0.042865	0.543675
5561	PUSH X	NonStatic	Step	23	6.872448	0.041492	0.555158

Displacement Ductility Demand (Y-Direction)

Conejo Crossover

The following table lists the nodes at the tops of columns that yield first under pushover analysis, at the step number shown. These nodal displacements are then compared with the displacements observed under MCE conditions.

StepNum	7			
	Δ_Y			
Row Labels	**Max of U2**	Δ_D	μ_D	
5225	1.945471	1.040962	0.535069	ok
5227	1.832844	1.000088	0.545648	ok
5231	1.723475	0.988787	0.573717	ok
5483	2.04061	1.087763	0.533058	ok

CSDC 2.2.4 Target Displacement Ductility Demand:

$\mu_D \leq 5$

TABLE: Joint Displacements				From stiff model			
Text	Text	Text	Text	Unitless	in	in	in
Joint	**OutputCase**	**CaseType**	**StepType**	**StepNum**	**U1**	**U2**	**U3**
5225	PUSH Y	NonStatic	Step	0	0.007412	-0.001246	-0.109398
5225	PUSH Y	NonStatic	Step	1	0.029289	0.252878	-0.101085
5225	PUSH Y	NonStatic	Step	2	0.053782	0.537078	-0.093789
5225	PUSH Y	NonStatic	Step	3	0.075808	0.825102	-0.086998
5225	PUSH Y	NonStatic	Step	4	0.090268	1.088933	-0.080763
5225	PUSH Y	NonStatic	Step	5	0.104655	1.351217	-0.074564
5225	PUSH Y	NonStatic	Step	6	0.119011	1.613043	-0.068376
5225	PUSH Y	NonStatic	Step	7	0.150928	1.945471	-0.054112
5225	PUSH Y	NonStatic	Step	8	0.230954	2.480354	-0.022027
5225	PUSH Y	NonStatic	Step	9	0.260593	3.078476	0.012016
5225	PUSH Y	NonStatic	Step	10	0.249814	3.570537	0.047571
5225	PUSH Y	NonStatic	Step	11	0.277769	4.035943	0.096783
5225	PUSH Y	NonStatic	Step	12	0.357284	4.684653	0.167691
5225	PUSH Y	NonStatic	Step	13	0.407002	5.547254	0.265017
5225	PUSH Y	NonStatic	Step	14	0.294944	6.96392	0.433566
5225	PUSH Y	NonStatic	Step	15	-0.142275	9.013418	0.666701
5225	PUSH Y	NonStatic	Step	16	-0.539417	10.100124	0.785898
5227	PUSH Y	NonStatic	Step	0	0.004066	-0.000194	-0.112599
5227	PUSH Y	NonStatic	Step	1	0.026165	0.240069	-0.104209
5227	PUSH Y	NonStatic	Step	2	0.050905	0.50668	-0.09679
5227	PUSH Y	NonStatic	Step	3	0.073203	0.778009	-0.089949
5227	PUSH Y	NonStatic	Step	4	0.087838	1.029789	-0.083632
5227	PUSH Y	NonStatic	Step	5	0.102397	1.280086	-0.077352
5227	PUSH Y	NonStatic	Step	6	0.116926	1.529946	-0.071084
5227	PUSH Y	NonStatic	Step	7	0.148656	1.832844	-0.060852
5227	PUSH Y	NonStatic	Step	8	0.229162	2.320109	-0.031314
5227	PUSH Y	NonStatic	Step	9	0.258874	2.889931	0.0015
5227	PUSH Y	NonStatic	Step	10	0.246784	3.372136	0.031086

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5227	PUSH Y	NonStatic	Step	11	0.275299	3.813567	0.073144
5227	PUSH Y	NonStatic	Step	12	0.354893	4.415406	0.138597
5227	PUSH Y	NonStatic	Step	13	0.405735	5.236827	0.229672
5227	PUSH Y	NonStatic	Step	14	0.292849	6.68548	0.401084
5227	PUSH Y	NonStatic	Step	15	-0.147632	8.98384	0.659597
5227	PUSH Y	NonStatic	Step	16	-0.546952	10.288016	0.799281
5231	PUSH Y	NonStatic	Step	0	0.003259	0.000716	-0.109679
5231	PUSH Y	NonStatic	Step	1	0.025245	0.227861	-0.10173
5231	PUSH Y	NonStatic	Step	2	0.049894	0.477536	-0.094697
5231	PUSH Y	NonStatic	Step	3	0.072156	0.732098	-0.088268
5231	PUSH Y	NonStatic	Step	4	0.086735	0.97206	-0.082231
5231	PUSH Y	NonStatic	Step	5	0.101239	1.210599	-0.076229
5231	PUSH Y	NonStatic	Step	6	0.115713	1.448722	-0.070238
5231	PUSH Y	NonStatic	Step	7	0.146568	1.723475	-0.06319
5231	PUSH Y	NonStatic	Step	8	0.227519	2.160767	-0.037238
5231	PUSH Y	NonStatic	Step	9	0.257767	2.701233	-0.005924
5231	PUSH Y	NonStatic	Step	10	0.244808	3.173806	0.021712
5231	PUSH Y	NonStatic	Step	11	0.273226	3.590157	0.054007
5231	PUSH Y	NonStatic	Step	12	0.353677	4.142434	0.113444
5231	PUSH Y	NonStatic	Step	13	0.404836	4.91898	0.197634
5231	PUSH Y	NonStatic	Step	14	0.2927	6.395964	0.37299
5231	PUSH Y	NonStatic	Step	15	-0.148	8.940115	0.661466
5231	PUSH Y	NonStatic	Step	16	-0.548067	10.460913	0.824608
5483	PUSH Y	NonStatic	Step	0	0.01338	-0.003188	-0.088873
5483	PUSH Y	NonStatic	Step	1	0.034409	0.262978	-0.082687
5483	PUSH Y	NonStatic	Step	2	0.05804	0.562753	-0.07756
5483	PUSH Y	NonStatic	Step	3	0.07925	0.865628	-0.072726
5483	PUSH Y	NonStatic	Step	4	0.093108	1.139973	-0.068016
5483	PUSH Y	NonStatic	Step	5	0.106896	1.412719	-0.063333
5483	PUSH Y	NonStatic	Step	6	0.120655	1.684989	-0.058659
5483	PUSH Y	NonStatic	Step	7	0.152267	2.04061	-0.041722
5483	PUSH Y	NonStatic	Step	8	0.231803	2.621639	-0.008053
5483	PUSH Y	NonStatic	Step	9	0.261536	3.247207	0.027644
5483	PUSH Y	NonStatic	Step	10	0.251314	3.749071	0.072784
5483	PUSH Y	NonStatic	Step	11	0.279033	4.237652	0.127134
5483	PUSH Y	NonStatic	Step	12	0.358012	4.931261	0.203681
5483	PUSH Y	NonStatic	Step	13	0.407824	5.833675	0.306311
5483	PUSH Y	NonStatic	Step	14	0.298279	7.218164	0.47829
5483	PUSH Y	NonStatic	Step	15	-0.131391	9.020191	0.70292
5483	PUSH Y	NonStatic	Step	16	-0.524726	9.889438	0.810182

Local Member Ductility Capacity

Conejo Crossover

Pushover run on single fixed-fixed column in both X and Y directions, with 5 column loading permutations for each case

Limit μ_c **3**

				Collapse					Yield					Ductility		
Hinge	**Top Joint**	**Mid Joint**	**Bot Joint**	u_{c3}	u_{c2}	u_{c1}	Δ_{c2}	Δ_{c1}	u_{y3}	u_{y2}	u_{y1}	Δ_{y2}	Δ_{y1}	μ_{c2}	μ_{c1}	
Pushover X-1:																
Top	6	8	7	-2.376	-1.310	0.000	**-1.066**	**-1.310**	-0.340	-0.201	0.000	**-0.139**	**-0.201**	7.69	9.45	ok
Bottom	6	8	7	-3.120	-1.682	0.000	**-1.438**	**-1.682**	-0.792	-0.518	0.000	**-0.274**	**-0.518**	5.25	6.14	ok
Pushover X-2:																
Top	6	8	7	-2.373	-1.308	0.000	**-1.065**	**-1.308**	-0.339	-0.201	0.000	**-0.138**	**-0.201**	7.69	9.45	ok
Bottom	6	8	7	-3.117	-1.680	0.000	**-1.437**	**-1.680**	-0.789	-0.516	0.000	**-0.273**	**-0.516**	5.26	6.15	ok
Pushover X-3:																
Top	6	8	7	-2.374	-1.309	0.000	**-1.065**	**-1.309**	-0.340	-0.201	0.000	**-0.139**	**-0.201**	7.68	9.44	ok
Bottom	6	8	7	-3.117	-1.680	0.000	**-1.437**	**-1.680**	-0.790	-0.517	0.000	**-0.274**	**-0.517**	5.25	6.14	ok
Pushover X-4:																
Top	6	8	7	-2.394	-1.318	0.000	**-1.076**	**-1.318**	-0.339	-0.200	0.000	**-0.138**	**-0.200**	7.78	9.53	ok
Bottom	6	8	7	-3.090	-1.666	0.000	**-1.424**	**-1.666**	-0.787	-0.515	0.000	**-0.272**	**-0.515**	5.23	6.12	ok
Pushover X-5:																
Top	6	8	7	-2.399	-1.317	0.000	**-1.083**	**-1.317**	-0.311	-0.181	0.000	**-0.130**	**-0.181**	8.32	10.12	ok
Bottom	6	8	7	-3.119	-1.677	0.000	**-1.442**	**-1.677**	-0.743	-0.489	0.000	**-0.255**	**-0.489**	5.67	6.59	ok
Pushover Y-1:																
Top	6	8	7	2.479	1.342	0.000	**1.137**	**1.342**	0.372	0.213	0.000	**0.160**	**0.213**	7.13	8.41	ok
Bottom	6	8	7	3.127	1.666	0.000	**1.461**	**1.666**	0.751	0.478	0.000	**0.273**	**0.478**	5.35	6.09	ok
Pushover Y-2:																
Top	6	8	7	2.489	1.342	0.000	**1.147**	**1.342**	0.377	0.214	0.000	**0.162**	**0.214**	7.06	8.26	ok
Bottom	6	8	7	3.089	1.642	0.000	**1.447**	**1.642**	0.713	0.454	0.000	**0.259**	**0.454**	5.59	6.34	ok
Pushover Y-3:																
Top	6	8	7	2.488	1.342	0.000	**1.146**	**1.342**	0.376	0.214	0.000	**0.162**	**0.214**	7.09	8.29	ok
Bottom	6	8	7	3.088	1.642	0.000	**1.446**	**1.642**	0.712	0.454	0.000	**0.258**	**0.454**	5.60	6.36	ok
Pushover Y-4:																
Top	6	8	7	2.488	1.340	0.000	**1.148**	**1.340**	0.380	0.215	0.000	**0.165**	**0.215**	6.97	8.14	ok
Bottom	6	8	7	3.088	1.640	0.000	**1.448**	**1.640**	0.736	0.464	0.000	**0.272**	**0.464**	5.33	6.03	ok
Pushover Y-5:																
Top	6	8	7	2.510	1.352	0.000	**1.158**	**1.352**	0.374	0.213	0.000	**0.161**	**0.213**	7.18	8.39	ok
Bottom	6	8	7	3.134	1.664	0.000	**1.470**	**1.664**	0.710	0.452	0.000	**0.258**	**0.452**	5.71	6.46	ok

Note: Bottom hinge of Y-1 case displays unusual flexure during hinging questioning the validity of the results. This result is not within the same range as the remaining results and is reasoned to be anomalous. Result disregarded.

Monopile Capacity Protection Check

Conejo Crossover

Maximum Moment Demand and associated shear and axial (taken at the base of the column)

Model:	20130307 SAP Conejo PO (soft)	
Node	5584	
Load Case	PUSH X	
$P_{[M]}$	864	k
P_{min}	-779	
$[V]_{[M]}$	1231	k
[M]	181496	k-in

Structure Parameters

Height of column	L _col	26.5	ft
(1) Colmn Fixed-Free (2) Column Fixed-Fixed	CSDC Figure 3.1.3-2	2	
Length of Pile	L_pile	115	ft
Number of Piles per Column	N	1	
Group Reduction Factor		0.7916	3 row, 3.33B

Geotech Analysis (per pile) for Hanford

Preliminary shear demand	V	2000	kip
Max Pile M demand from V	M	220000	kip-in

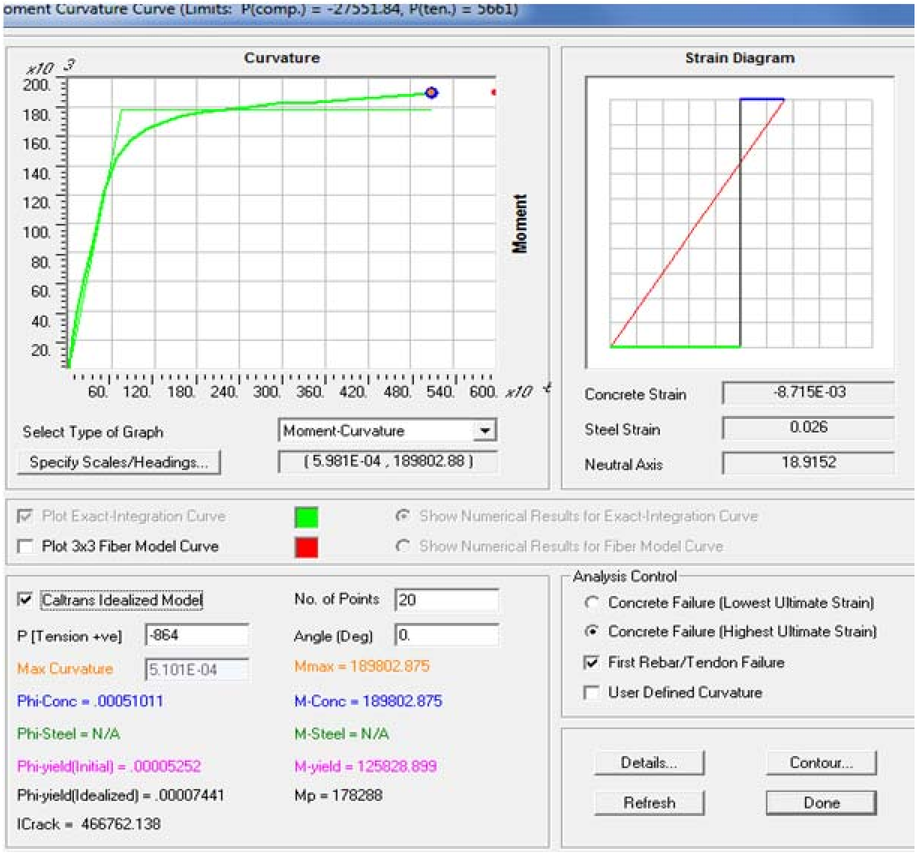
Pile Overstrength Demand

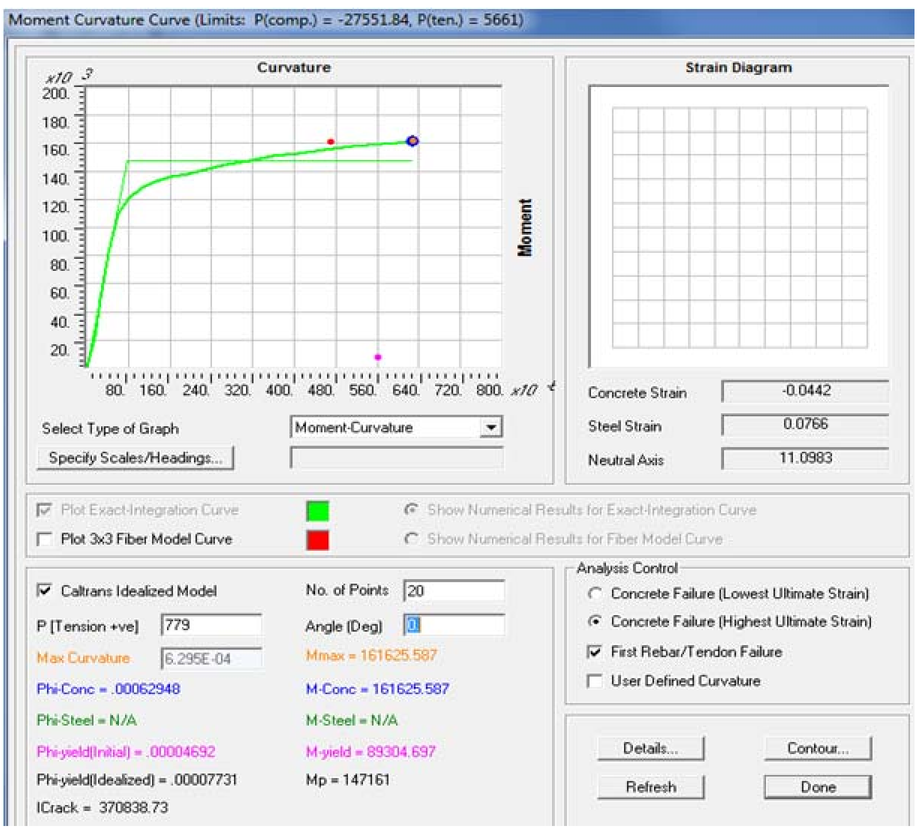
		Max P	Min P	
Column Self Weight Axial	P_{DL}	864	-779	kips
1.2*Pmax, 0.9*Pmin	Po	1037	-935	kips
†Mp at Po 6ft Dia, 1% reinf, f_{ue}	Mp	**182261**	**144286**	kip-in
1.2*Mp	Mo	218713	173143	kip-in
Mo*L or Mo*L/2	Vo	1376	1089	kip
Vo per pile	Vo_pile	1376	1089	kip
	w/ Group factor	**1738**	**1376**	kip
Mo per pile as a ratio of Geo data	Mo_pile	151311	119785	kip-in
	w/ Group factor	**191146**	**151320**	kip-in

Pile Capacity

Po per pile	Po_pile	1037	-935	kip
†Mp at Po_pile 9ft dia, 1% reinforcing	Mp_pile	**309907**	**245915**	kip-in
Reduced Mp_pile	Mp_pile'	245322	194666	kip-in
D/C Ratio	Mo_pile/Mp_pile	0.617	0.615	
	Check	OK	OK	

† Section capacity from CSiBridge model Section Designer Moment Curvature Curve Caltrans Idealized Model.


oment Curvature Curve (Limits: P(comp.) = -27551.84, P(ten.) = 5661)
Curvature
Strain Diagram
Moment
Concrete Strain -8.715E-03
Steel Strain 0.026
Neutral Axis 18.9152
Select Type of Graph Moment-Curvature
Specify Scales/Headings...
(5.981E-04 , 189802.88)
Plot Exact-Integration Curve
Plot 3x3 Fiber Model Curve
Show Numerical Results for Exact-Integration Curve
Show Numerical Results for Fiber Model Curve
Caltrans Idealized Model
No. of Points 20
P [Tension +ve] -864
Angle (Deg) 0.
Max Curvature 5.101E-04
Mmax = 189802.875
Phi-Conc = .00051011
M-Conc = 189802.875
Phi-Steel = N/A
M-Steel = N/A
Phi-yield(Initial) = .00005252
M-yield = 125828.899
Phi-yield(Idealized) = .00007441
Mp = 178288
ICrack = 466762.138
Analysis Control
Concrete Failure (Lowest Ultimate Strain)
Concrete Failure (Highest Ultimate Strain)
First Rebar/Tendon Failure
User Defined Curvature
Details...
Contour...
Refresh
Done


Moment Curvature Curve (Limits: P(comp.) = -27551.84, P(ten.) = 5661)
Curvature
Strain Diagram
Moment
Concrete Strain -0.0442
Steel Strain 0.0766
Neutral Axis 11.0983
Select Type of Graph Moment-Curvature
Specify Scales/Headings...
Plot Exact-Integration Curve
Plot 3x3 Fiber Model Curve
Show Numerical Results for Exact-Integration Curve
Show Numerical Results for Fiber Model Curve
Caltrans Idealized Model
No. of Points 20
P [Tension +ve] 779
Angle (Deg) 0
Max Curvature 6.295E-04
Mmax = 161625.587
Phi-Conc = .00062948
M-Conc = 161625.587
Phi-Steel = N/A
M-Steel = N/A
Phi-yield(Initial) = .00004692
M-yield = 89304.697
Phi-yield(Idealized) = .00007731
Mp = 147161
ICrack = 370838.73
Analysis Control
Concrete Failure (Lowest Ultimate Strain)
Concrete Failure (Highest Ultimate Strain)
First Rebar/Tendon Failure
User Defined Curvature
Details...
Contour...
Refresh
Done